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COMPUTERWORLD

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Product Spotlight — Look in the mirror before making a minicomputer purchase. Page 75.

Reconcilable differences? IBM and Microsoft say they've improved development processes, but outsiders view division of responsibilities as a parting of the ways. Page 4.

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Amdahl offers more MIPS than IBM's ES/9000 but needs a longer rollout schedule to deliver. Page 4.

Memory bash: Third parties up in arms over cost of adding memory to ES/9000 models. Page 121.

COMPUTERWORLD BUYERS' SCORECARD

Cost of ownership

HP 3000 users are most satisfied with their overall cost of ownership

See ratings page 80

Product	Score*
Response base 50 users per product	
HP 3000 Model 925	67
IBM AS/400 Model 60	61
AT&T 3B2 Model 600	61
DEC VAX 6000 Model 210	55

*Scores are based on product ratings combined with importance assigned to each criterion.

CW Chart: Paul Mock

Outsourcing's hidden cost bite

BY CLINTON WILDER
and NELL MARGOLIS
CW STAFF

Information systems departments that choose outsourcing may run into a hidden and potentially costly surprise — jacked-up bills from outsourcing vendors hit by hefty license transfer fees from software houses.

Computer Associates International, Inc. was cited by several outsourcing services vendors as particularly tough on the issue. "Only one vendor has drawn a line in the sand," one outsourcing company representative said.

Garden City, N.Y.-based CA is taking an aggressive stance in seeking revenue when its customers attempt to transfer software licenses — including outsourcing vendors. Such practices have angered some outsourcing users and could threaten the savings that make outsourcing an attractive option to some IS shops.

The transferees' "assumption was probably that they could just move this [software] around without having to pay for it," said Bryan Shepherd, CA's executive vice-president of marketing. "Well, that isn't the case."

The software license transfer issue is a touchy one and is the subject of intense negotiations in several current outsourcing situations. Many users and outsourcing vendors acknowledged the problem but refused to name the software company or companies involved. One IS director said his situation may soon involve litigation.

Outsourcing vendors hit by the fees feel they must pass them on to the users just to stay in the outsourcing business. "We're not trying to gouge people, but if we're going to be charged more, we have to go to

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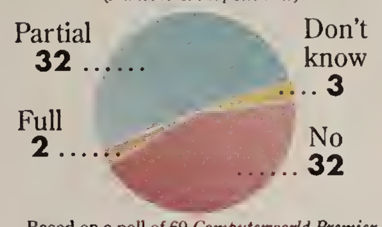
Do you expect to consider full or partial outsourcing during the coming year?

(Number of respondents)



Based on a poll of 69 *Computerworld Premier 100* IS managers

Besieged Oracle acts to quell loss

BY JEAN S. BOZMAN
CW STAFF

REDWOOD CITY, Calif. — It will be a vastly restructured and greatly humbled Oracle Systems Corp. that faces customers at its annual user group conference this week. The company said last week that it will pare down its domestic work force by 10% and that several key executives are departing as it attempts to deal with the expected $20 million quarterly loss it predicted earlier this month.

Oracle customers, some of whom view the company's marketing practices as extravagant, are not concerned by the raw numbers; nevertheless, some are wary that cost-cutting might begin to take its toll on support and development as the company attempts to update more than 80 releases of its software for various hardware platforms.

Oracle's growth plans have been trimmed in recent months from 100% per year — its norm for the last 10 years — down to 50% last spring and again this

Continued on page 120

IBM mainframe checks out, Unix checks in at the Hyatt

BY ELLIS BOOKER
CW STAFF

CHICAGO — Hyatt Hotels Corp. last month unceremoniously shut the door on the IBM 4381 mainframe that had been running its customer reservation system since 1982 and replaced it with four Unix-based processors from AT&T.

The $12 million project makes Hyatt perhaps the largest commercial installation at which Unix has been deployed for on-line transaction processing.

The hotel chain's decision is also a watershed of sorts, lending credence to a growing body of evidence that Unix-based "open systems" *can* handle applications that until recently were widely regarded as the sole province of proprietary mainframes and specialized software.

"The technologists were intrigued with Unix," John Biggs, Hyatt's senior vice-president of accounting and administration, said in an interview last week. "But from a business standpoint, what it gives us is flexibility."

For Gordon Kerr, Hyatt's vice-president of MIS, the issue was one of productivity — specifically, the chance to use fourth-generation development tools. With an older IBM transaction processing system in use at Hyatt, Kerr said, "You need three to four years of experience to be productive . . . but only one to two years with a 4GL."

Kerr said he assumes his support costs will drop from the current $7 million to $8 million per year level. "I expect that by making this change we'll realize 20% cost savings," he said.

Hyatt was already along the road with Unix before it tackled

Continued on page 121

IN DEPTH: SIZING UP MCC

R&D group finds shoes it can fill

BY GLENN RIFKIN
CW STAFF

There's nothing tougher on a ball player than great expectations. The same holds true for a research consortium. Just ask MCC.

The Microelectronics and Computer Technology Corp., the first major consortium in the U.S., has been fighting an uphill battle ever since it was founded in 1983 with the unrealistic perception — set off by the furor caused by a major Japanese artificial intelligence push — that it would fend off Japan in the race for global technology dominance.

Seven years later, after a bumpy start, MCC is building a quiet success story, fulfilling its mission to offer corporations a way to leverage long-term research. Though the technical achievements of its four diverse internal programs vary in importance, MCC has outlived the naysayers who have waited for its demise. In so doing, it has found a workable structure that is attracting more and more shareholders and members and has become a model for other U.S. consortiums such as Sematech.

Unfortunately for MCC, it had no blueprint for success because it was the first major U.S. consortium. Mistakes were made, processes took longer than expected to be smoothed into place, and only in the past two years has real progress begun to show.

In addition, the sensitivity of its work and relationships with shareholder companies make it somewhat difficult for MCC to boast about its achievements. A series of significant, although

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Zigy Kaluzny

MCC's chairman, Dove

NEWSPAPER

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7 **Next** rolls out the wherewithal to survive in the computer industy — at least 'til next year.

8 **NCR** is blazing new trails, leaving proprietary architectures behind and heading for the green pastures of Unix and Intel microprocessor platforms.

10 IBM brings OSI compliance to its major systems as promised — two years ago.

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Quotable

"We can never let the ownership go, because the only asset we have is our software."

BRYAN SHEPHERD
COMPUTER ASSOCIATES

On the license transfers in outsourcing cases. See story page 1.

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75 You can call it a specialized processor, you can call it a server — but you may still end up buying a **minicomputer.**

IN DEPTH

1 At the age of seven, **Microelectronics and Computer Technology Corp.** is building a quiet success story. By Glenn Rifkin.

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From Ruth Stanat's *The Intelligent Corporation*: "A growing number of IS departments have actively become involved in developing corporate intelligence networks, especially because many have become more closely associated with the sales and marketing functions of organizations. In addition, the IS departments as a whole are increasing in manpower, corporate backing and budgets to finance a shared information network . . . The IS function will gain a stronger presence in the corporate intelligence network, primarily because most CIOs have information systems or data processing backgrounds."

Hardware choices abound in listing of late-model machines. Page 75.

······························

Peter Yates

Steelcase and Mark Greiner believe that multimedia is the way to sell furniture. Page 55.

EXECUTIVE BRIEFING

■ **There's a hidden cost to outsourcing for some users** — big software license transfer fees from Computer Associates and other software vendors. The charges assessed against outsourcing vendors are usually passed along to the outsourcing customer, which has caused some users to rethink their outsourcing decision or switch service vendors. CA says it's simply protecting the company's only real assets — software licenses. **Page 1.**

■ **Hyatt Hotels has chosen Unix** to displace IBM's operating system for transaction processing. In what could be the largest commercial installation of Unix for transactions, Hyatt's move lends credence to the growing movement toward open systems for business workhorse applications. Hyatt moved its reservations system from an IBM 4381 running TPF to four Unix-based processors from AT&T. **Page 1.**

■ **The nation's first major R&D consortium** is quietly building a success story — seven years after its bumpy start. Microelectronics and Computer Technology Corp. (MCC) has overcome the unrealistic early expectations that it could fend off Japan in the global technology race. Today, observers say that MCC is fulfilling its mission of helping U.S. member corporations leverage its long-term research. **Page 1.**

■ **Amdahl continued the current mainframe one-upmanship race** by announcing new systems that can couple eight CPUs for a total of 350 MIPS. But like the IBM ES/9000 they outrun, Amdahl's entries won't be available until late next year. **Page 4.**

■ **IBM made good on its OSI promise** by endorsing the international standard across its major operating systems. Now it is the users' turn to sort out the new offerings in their own environments. **Page 10.**

■ **The failure of an executive information system** project at Mutual Benefit Life provides a good case study for the "don'ts" of EIS implementation. The insurance firm says it has learned its lessons — and may try again. **Page 69.**

■ **Beauty is in the eyes of the beholder** when it comes to purchasing a minicomputer today: One person's trusty departmental processor may not work as well as another's server. For that reason, it's a good idea to figure out what type of buyer you are before evaluating the machines. **Page 75.**

■ **AS/400 proficiency is in great demand these days** — and the void far exceeds the supply of experienced professionals. The U.S. AS/400 installed base has tripled since January 1989, and recruiters are scrambling to fill all of the new openings. **Page 104.**

■ **Multimedia is graduating from the classroom** and entering the business world in more areas than just training. However, IS managers considering multimedia approaches to applications should take care in buying equipment. There are wide price swings and several configuration issues to ponder. **Page 112.**

■ **On-site this week:** An Apple multimedia application has changed the way designers think about office furniture at Steelcase in Grand Rapids, Mich. **Page 55.** Group Hospitalization and Medical Services, a Washington, D.C.-based insurer, is using the French connection — France's Minitel videotex network — for eligibility verification for members who need medical care overseas. **Page 64.** Elsewhere in the insurance world, the Auto Club of Southern California employs IBM's Imageplus imaging system to process 33,000 pieces of paper daily. **Page 25.** A bull in Steel City — a Bull 8000 mainframe, to be exact — serves more than 2,000 municipal employee users in the city of Pittsburgh's IS department. **Page 29.**

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Microsoft, IBM split OS/2 licensing

BY PATRICIA KEEFE
CW STAFF

No, IBM and Microsoft Corp. did not file for divorce last week. They opted instead for a much-needed separation on microcomputer operating systems development, leaving more questions unanswered than resolved.

At least that was the verdict from users and other industry observers after the firms announced a license agreement extension that was couched in terms of a unity pledge, the second such treatise in less than a year [CW, Nov. 20].

IBM is now the primary developer of the 16- and 32-bit OS/2. Microsoft will focus on DOS and Windows and continue its efforts to build a portable OS/2 for reduced instruction set computing systems; it will also continue to support OS/2 OEMs. The partners will jointly define product specifications, contribute to each project and cross-license all resulting technology.

With reservations, Microsoft has agreed to offer OS/2 Lite, a 2M-byte version of OS/2, said Steve Ballmer, Microsoft's senior vice-president of systems development. In return, IBM has licensed Windows Version 3.0.

Users interviewed last week said the announcement would have little or no impact on their desktop strategies.

Dan Lautenbach, IBM's director of OS/2 marketing, said there is no rift and denied that IBM is impatient with Microsoft: "We are disappointed that OS/2 has not been accepted faster than it has, but we were not surprised by Windows' success."

Left unanswered, industry observers said, are a multitude of issues, including the following:

- How far will IBM go in tailoring OS/2 to its hardware platform and mainframe connectivity?
- Will IBM actively resell Windows?
- Will IBM and Microsoft position OS/2 Lite and Windows 3.0 as competitors?
- Will Microsoft extend Windows' functionality beyond limits set in last fall's announcement?

Also uncertain is whether the effort to "reaffirm" a strong relationship between IBM and Microsoft is for real.

"The credibility of these kinds of announcements is not too high; remember, they clarified their position in November, too," said Charles Colpitt, director of workstations and personal computer software at The Travelers Corp. in Hartford, Conn. IBM and Microsoft's first stab at surmounting differences over OS/2 and Windows was at Comdex/Fall '89.

Meanwhile, the plan to divvy up control of OS/2 development as an "efficiency" move was roundly applauded by analysts as pragmatic and long overdue.

"I think the rift has been overplayed. Let's face it, they are just formalizing what has been going on for a long time," said Nancy McSharry, an analyst at International Data Corp.

Developers were cautiously upbeat. "The only way to develop a successful operating system is to have the group most motivated to finish it. Clearly OS/2 is strategic to IBM," said Fred Gibbons, president of Software Publishing, Inc. IBM said last week that it will begin delivery of advance beta-test copies of the 32-bit OS/2 Version 2.0 in December; the finished product is slated to ship in June, said Ron Adinolfi, a vice-president at Swiss Bank Corp.

But questions remain. "The fundamental questions regarding the migration path of Windows to [OS/2] Presentation Manager and whether Windows is going to be part of [IBM's Systems Application Architecture] still need to be answered," Ashton-Tate Corp. President William Lyons said.

IBM and Microsoft officials declined to elaborate on their new development arrangements or update unkept promises made at Comdex/Fall.

Ten months after the fact, the partnership has failed to complete at least two goals: convergence of their LAN Manager-based file servers and unbundling of IBM's OS/2 Extended Edition.

A follow-up announcement in about a month is expected to reemphasize support and monetary commitment to further development of OS/2 and to provide some direction, if not details, about IBM's Windows and Officevision strategy.

Amdahl reacts to ES/9000 with processor power play

BY JEAN S. BOZMAN
CW STAFF

SUNNYVALE, Calif. — Amdahl Corp. muscled past the top end of IBM's recently announced Enterprise System/9000 line last week, announcing a new high-end machine with eight processors that the company promised will deliver nearly 350 million instructions per second (MIPS).

Yet none of the high-end machines from IBM or Amdahl — or Hitachi Data Systems Corp.'s EX 310 and EX 320, announced in June — will be available until mid-1991 or later, industry analysts pointed out.

Amdahl announced 10 models in the 5990 series, but the more powerful 5995 M models will not be available until late 1991, with the six- and eight-way configurations waiting in the wings until second-quarter 1992.

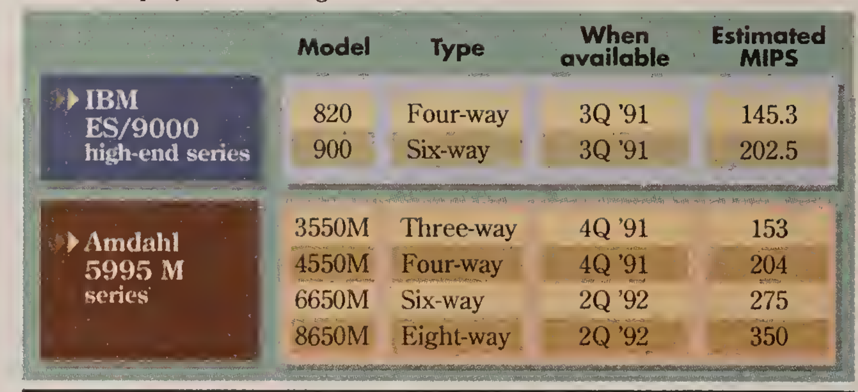
"If Amdahl had its way, it wouldn't be announcing these boxes with a 1½-year lead time," said Bob Djurdjevic, president of Annex Research in Phoenix. He noted that IBM and IBM-compatible vendors are taking market risks by announcing machines more than a year ahead of delivery.

Reacting to the stretched-out delivery schedule, potential users were hesitant last week to express any purchase commitments. "The good thing with Amdahl is we expect it will help keep prices down," said George Sekely, vice-president of computers and communications at Canadian Pacific Co.

"We have quite a few Amdahl systems, but it's just an announcement," said Bill Friel, an ex-vice-president at Prudential Service Co. Clearly, the prospect of competitive pricing pressure on IBM was welcome.

Fighting machines

Just two weeks after IBM announced its new mainframe family, Amdahl claimed a performance edge with its 5995 series



	Model	Type	When available	Estimated MIPS
IBM ES/9000 high-end series	820	Four-way	3Q '91	145.3
	900	Six-way	3Q '91	202.5
Amdahl 5995 M series	3550M	Three-way	4Q '91	153
	4550M	Four-way	4Q '91	204
	6650M	Six-way	2Q '92	275
	8650M	Eight-way	2Q '92	350

Source: Technology Investment Strategies Corp./Gartner Group, Inc. CW Chart: Paul Mock

"I want to know how the new Amdahl machines compare to those [IBM] machines," said Bill Vetter, manager at Illinois' communications and computer services bureau. "I believe that neither vendor should forget there's always an alternative."

Although Amdahl jumped the gun on IBM in terms of the number of tightly linked processors it can configure, analysts expect IBM will have its own eight-way version. Jim Cassell, an analyst at Gartner Group, Inc. in Stamford, Conn., said he expects IBM will announce an eight-way version next year for delivery in '92.

The first six models of the Amdahl 5995 computer line featuring 10-nsec cycle time will start shipping this month. Shipments of more powerful 7-nsec models are planned for the fourth quarter of 1991. Prices range up to $32.1 million.

The uniprocessor is rated by Amdahl at more than 50 MIPS; analysts pegged IBM's uniprocessor at more than 40 MIPS.

Amdahl engineers still do not know how long it will take them to match IBM's new ES/9000 features, including the new Escon fiber-optic channel features. "Obviously, we're still analyzing [IBM's] Sept. 5 announcement," said Erika Williams, vice-president of processor product management at Amdahl.

Amdahl also promised to support ES/9000's encryption and security features, its Sysplex features and the latest version of the IBM operating systems.

Amdahl unveiled new features of its own, including a "concurrent maintenance" system that will allow Amdahl mainframes to operate while preventive maintenance is carried out on parts of the computer. "If the machine is designed properly, you can take one of those processors off-line and work on it, even replace it, while the rest of the machine continues to operate," said Mark Hess, program director of IBM large-scale systems research at Gartner Group.

Amdahl claimed more than 1,000 mainframe sites but would not specify the exact distribution of installed machines.

"Over the next five weeks, each 5990 user worldwide will receive a proposal specifically tailored to their environment," said Chuck Fonner, Amdahl's vice-president of systems marketing.

Amdahl will continue to ship its older 5890 machines.

Senior Editor Rosemary Hamilton contibuted to this report.

CORRECTION

The hardware assist option announced with IBM's DB2, Release 2.3 [CW, Sept. 10] is microcode that is already included in the System/390 hardware family, not a processor add-in. Also, DB2 application binds still require users to bring applications down, but only for a few seconds.

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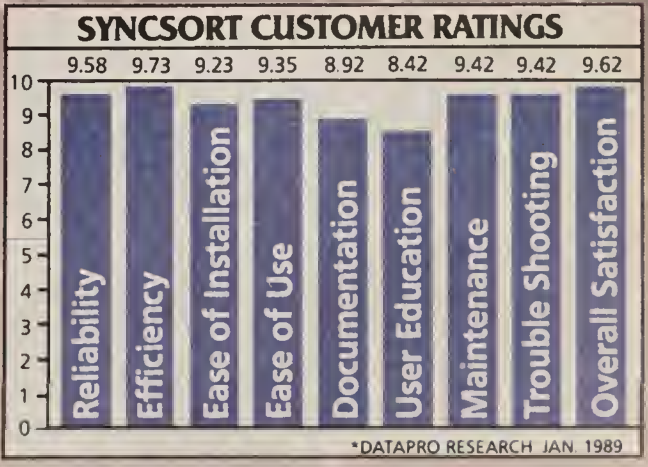

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NEWS SHORTS

Investors cite Unisys, CDC, Xerox

The United Shareholders Association, a Washington, D.C.-based group of shareholder rights activists, has named Unisys Corp., Control Data Corp. and Xerox Corp. to its list of 50 corporations targeted for reforms. At annual corporate meetings in 1991, the activists will offer proposals to eliminate poison pills, require shareholder approval of golden parachutes and establish confidential voting in corporate elections.

. . . .

IBM must replace 3390 fans

IBM confirmed a report last week of a manufacturing snag with its 3390 disk drives that will require it to replace fan units on all models installed between May and August 1990. Technology Investment Strategies Corp., a research firm in Framingham, Mass., issued a report late last week detailing a flawed fan design that caused some 3390 head disk assembly units to shut down, trapping data being accessed. IBM confirmed that the problem was causing disruptions but not loss of data. Bill Reedy, IBM marketing director for storage systems, said the firm will be replacing all fan units at the customers' convenience. Technology Investment Strategies said this will affect approximately 25% of the close to 8,000 units shipped to date.

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Globex schedule slips

The Chicago Mercantile Exchange, Chicago Board of Trade and Reuters Holding PLC recently announced that Globex, the after-hours international electronic trading network, is behind schedule. Originally expected to be up and running by late October, the partners now say it will be available in the first quarter of 1991. A source close to the project confirmed that testing of the system has been slower than expected but said that there were no serious problems with the software.

. . . .

Sybase offers MVS tools

Relational database management system vendor Sybase, Inc. last week introduced products designed to help integrate IBM MVS mainframe applications into network computing applications. The three new products include Sybase Open Server for CICS, designed to give access to all MVS data, applications and services; Sybase Open Gateway for DB2, which works with CICS and gives users an SQL-based gateway; and Sybase Netgateway, which is a network gateway designed to control and monitor communications between the IBM MVS mainframe and other client platforms, the company said. The Sybase products are slated to ship by the fourth quarter of 1990.

. . . .

Burton named president at Legent

When software vendors Duquesne Systems, Inc. and Morino Associates, Inc. merged two years ago to become Legent, Inc., the new company said it would seek a reputation as a hungry but benevolent acquirer: a firm in whose hands acquired executives could expect to be delighted, not deleted. John Burton would probably say that the Vienna, Va.-based software house is making good on its goal. Burton, the former vice-president of marketing at Legent's first acquisition — change control software maker BST — became president of Legent last week.

. . . .

Profits grow at 3Com

3Com Corp. last week announced encouraging first-quarter financial figures and the availability of Microsoft Corp.'s LAN Manager Version 2.0 in its product line. Net income for the first quarter rose to $5 million compared with $1.2 million for the first quarter of last year. Sales reached $106.2 million in the first quarter compared with $89.1 million a year ago. Meanwhile, the Santa Clara, Calif., company announced that it would begin shipping LAN Manager, Microsoft's network operating system, bundled with 3+Open menus and the 3+Open Netbios protocol at the end of this month. There was no word on when the new Microsoft operating system would be incorporated into 3Com's own LAN Manager-based 3+Open LAN Manager Version 1.1.

More shorts on page 121

Unisys probes S/36 territory

RAMP offers alternative to midrange AS/400 migration

BY MARYFRAN JOHNSON
CW STAFF

BLUE BELL, Pa. — Unisys Corp. plunged into unfamiliar waters last week with the introduction of a line of midrange computers that offers an alternative growth path for IBM System/36 users.

The System/36-look-alikes, dubbed Unisys RPG Application Migration Package, or RAMP, will be marketed to customers unwilling to migrate to IBM's AS/400 line.

"This is a viable product for Unisys to get a toe in the water" of the midrange market, according to Teresa Elms, president of Elms Technical Communications, a market research and consulting firm located in San Diego.

Based on the Unisys entry-level A series mainframe processors, the RAMP machines come in four single-processor models ranging in price from $19,900 to $115,000, a dual-processor model for $210,000 and a quad-processor model for $400,000. Storage capabilities run the gamut from 12M bytes to 192M bytes, and the systems support from 28 to 336 workstations.

Familiar menus

Unisys beefed up the CPU with the addition of an A series RPG II compiler, special workstation controllers to support IBM 5250-compatible terminals and printers and runtime software that maintains the menu-driven user interface familiar to System/36 faithfuls.

An automated migration facility allows relatively painless porting of System/34 or System/36 RPG II program libraries and data files to Unisys RAMP, the company said.

"This will appeal only to a subset of the System/36 population, but it does give them a growth path," Elms said. "[Users] can keep their [RPG II] software as it runs today, with no reprogramming, and they can keep all their terminals and peripherals, too."

The ability to hang onto peripherals could give Unisys — a virtual stranger to the IBM and commercial midrange markets — the boost it will need for this strategy to succeed, said John Logan, an analyst at Aberdeen Group in Boston.

In the U.S., Unisys will market its RAMP line only through value-added resellers, according to company officials, and 60% of its sales are expected to be from the international marketplace in Europe, Asia and South America.

Net management comes full Spectrum

BY JOANIE M. WEXLER
CW STAFF

ROCHESTER, N.H. — Network managers will be able to hang up their roller skates for good if a centralized, artificial intelligence-based enterprise network management system announced last week by Cabletron Systems, Inc. delivers on its promises.

Cabletron's Spectrum — a multilevel, object-oriented system recommended for heterogeneous networks of 1,000 nodes or more — is a Unix-based, protocol-independent platform designed to manage every device on a network, including nonintelligent equipment.

Cabletron acknowledged that its biggest sales challenge will be convincing companies that are wavering in their integrated network management decisions and are unfamiliar with Cabletron that the company is a viable player in the enterprise network management arena.

However, "in terms of what users want, Spectrum is the most extensible, flexible, open platform that's ever been offered," commented Jill Huntington-Lee, an analyst at Datapro Research, Inc. in Delran, N.J.

"This sounds like a product whose time has come," added Steve Patrick, director of computing services at Bradley University in Peoria, Ill. Patrick, who was unfamiliar with the $105-million-a-year Cabletron, said, "I would tend to be cautious with a new vendor, but I've certainly seen products hyped from the big players that wound up being less than expected."

Spectrum can reportedly evolve to let users view all their equipment from various perspectives and manage it from one workstation. The ability to isolate network management data into slices using one system prevents users from "peering into a big bowl of spaghetti that you can't see the bottom of," said Roger Dev, Cabletron's director of software engineering.

Currently, most integrated — or enterprisewide — network management involves several elemental systems that manage equipment from a particular vendor, then filter and pass critical data up to an enterprise system. The enterprise system then consolidates the data into a broad — but shallow — view of the whole network.

This multitiered approach requires managers needing deeper levels of detail about particular network segments to shuttle between different stations running individual elemental systems.

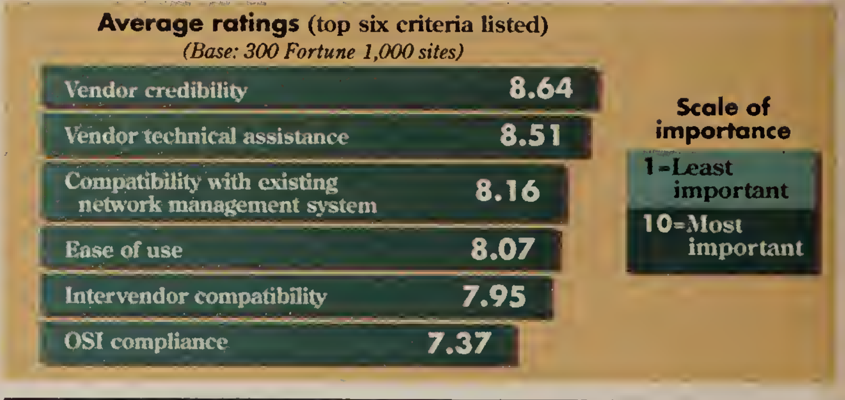
What differentiates Spectrum from IBM's Netview and other vendor schemes, said Chris Oliver, Cabletron's director of engineering and manufacturing, is that "the others rely on you to cause an action when you find out what's going on," while Spectrum handles both problem-finding and solving.

L. Michael Sabo, a Spectrum beta-test user at SSDS, Inc., a systems integrator in Littleton, Colo., said, "The product has everything our customers are asking for, and we've specified Spectrum on two major bids."

Spectrum, priced from $50,000 to $150,000, will use the Open Software Foundation's Motif graphical user interface and initially support three network management protocols, including the popular Simple Network Management Protocol. It is expected to be available in January for Sun Microsystems, Inc. Sparcstations, and several other common platforms, including Intel Corp. 80386-based personal computers, will be phased in.

Credibility factor

Vendor credibility, as opposed to technical issues, tops users' lists in rating network management products



Source: Business Research Group

CW Chart: Paul Mock

Jobs' Next unveils do-or-die systems, software

BY JAMES DALY
CW STAFF

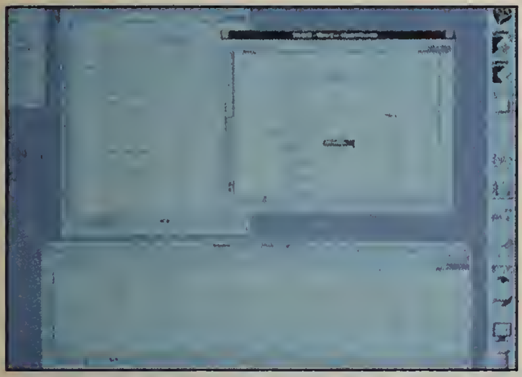
SAN FRANCISCO — It was put-up-or-shut-up time for Steven Jobs and his Next, Inc. venture last week as he unleashed a barrage of slick workstations and software packages designed to recharge the struggling company.

"This is the future of Next," Jobs said as he strolled across the stage at Louise M. Davies Symphony Hall, the same pulpit from which the firm unveiled its first products in October 1988.

Questions remained, however, as to just how long that future will be. Analysts said time could be running out for Next, which was born with a silver spoon in its mouth five years ago.

"Next has all the pieces in place, but [it] still needs to create the market buzz," said Jonathan Seybold, an analyst at Seybold Seminars in Malibu, Calif.

Although sales have been scarce — with even Jobs admitting that they are short of his expectations — Next has survived by mining a deep venture capital vein that includes $100 million from Japanese giant Canon, Inc., $20 million from billionaire Ross Perot and a licensing deal with IBM estimated to be worth more than $10 million.



Lotus' Improv *spreadsheet for Next offers different views of data relationships*

Analysts said, however, that the introduction will keep Next well equipped for the second wave of its assault on the desktop market. "Next has addressed the major weaknesses of its original computer," said Nicholas Baran, editor of "Baran's Tech Letter," an independent newsletter based in Sandpoint, Idaho, for Next computer users.

Leading the rollout were four models based on a 25-MHz Motorola, Inc. 68040 microprocessor. Each can execute about 15 million instructions per second, making them approximately three times faster than the 68030 that shipped with the original machine and comparable to Sun Microsystems, Inc.'s Sparcstation 1+.

The systems include the following:

- The low-end Nextstation begins at $4,995 — less than half the price of the original Next computer — and is scheduled to be available in November.
- Nextstation Color, a 16 bit/pixel color version of the same machine, will sell for $7,995 and ship in the first quarter of 1991.
- Nextcube, which can be used as a desktop server or high-end workstation, will retain the original computer's cube shape and sell for $7,995 when it is available in November.
- Nextdimension is a version of the Nextcube fitted with an additional 32 bit/pixel color board and color monitor. It will sell for approximately $14,000 when fully configured with photorealistic color and video capabilities and will be available in the first quarter of 1991.

Todd Rulon-Miller,. Next vice-president of sales, said the firm already has orders for 15,000 of the new machines — more than double the 7,000 machines International Data Corp. estimated the company has sold since its original introduction.

Jobs waved away concerns about the availability of the 68040, the production of which has been held up repeatedly because of design flaws. One Next staff member, however, privately confessed that "delivery of the chips has been slow."

Next also cleared up a problem by including a built-in 3½-in. floppy disk drive that stores 2.88M bytes of information on each machine. The original came with only an erasable optical disc, and developers often refused to deliver software on the more expensive optical discs.

Complementing the hardware rollouts and Release 2.0 of the operating system were software applications specifically designed for the Next environment. Packages from dozens of companies, including Lotus Development Corp., Wordperfect Corp., Oracle Systems Corp., Adobe Systems, Inc. and Frame Technology Corp. were presented.

Early users said that the new software will put Next over the top. "There's no other platform out there that can touch them; they're five years ahead of the competition," said Carmi Weinzweig, a research computerist at the Argonne National Laboratory in Argonne, Ill. Weinzweig said he has been evaluating the older models and now expects to have 100 Next machines installed by the end of next year.

The star of the software show was clearly Lotus' Improv spreadsheet, which Jobs had earlier called the "compelling application" that will lure users to Next. Improv, which was designed for Next, clears up the complications sometimes associated with spreadsheets by using English commands instead of numerical syntax.

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NCR scraps proprietary history for Intel, Unix

BY ELLIS BOOKER
CW STAFF

NEW YORK — NCR Corp. forged into new territory last week, becoming the first of the old-line mainframe companies to abandon its proprietary hardware and software architectures in favor of a broad line of machines built around a common microprocessor family and Unix.

The breadth of the NCR System 3000 planned lineup is ambitious, spanning from portables running MS-DOS and OS/2 and topping out with mainframe-class, parallel processor systems. Moreover, the choice of Intel Corp.'s microprocessor platform to replace an established mainframe base, along with selection of Unix Version 4 as the primary operating system, confirms the ascendancy of the microprocessor and telegraphs the open systems trend in the industry, analysts said.

NCR also unveiled a storage system for the System 3000. Called the 6298, it will use redundant array of inexpensive disks (RAID) technology and will feature 20 interlinked drives offering a total of 8.4G bytes of storage. In addition to midrange systems and high-end targets, NCR unveiled three high-end desktop models using Intel's 80386SX microprocessor and two versions of the I486 chip. Low-end desktops and portables will be added later.

"Usually, people keep these things quiet," but NCR decided to shock everyone and reveal their plans for the next two years, said Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C.

NCR officials, for their part, were not bashful about heralding the significance of the move. "This is the most important announcement in NCR's history," said Chief Executive Officer Charles E. Exley last Tuesday in New York. Exley positioned the 3000 as NCR's general-purpose computing family for the 1990s.

Observers outside the Dayton, Ohio, company restrained their enthusiasm, however, noting that the top-of-the-line level, the 3700, will not even appear until the third quarter of 1992.

"They've put something together that is quite dramatic," Dzubeck said. "Whether this all plays out in the next two years is the question."

New era at NCR

The middle and upper tiers of NCR's planned system lineup will initially reach 320 MIPS and then soar into enterprise systems, promising thousands of MIPS

Product group	System type	Model number	Performance in MIPS	Intel processor	Price	Available
Level 3400	Servers (uni- and multiprocessors)	3445	27	I486 (33 MHz)	\$20,000-\$85,000	Currently
		3450	40-160	1-4 I486 (50 MHz)	\$35,000-\$200,000	Q2 '91
Level 3500	Symmetric multiprocessors	3550	80-320	2-8 I486 (50 MHz)	\$100,000-\$800,000	Q2 '91
Level 3600	Parallel processors	—	4,000+	I486		Q3 '91 (target date)
Level 3700	Parallel processors	—	100,000+	I486	—	Q3 '92 (target date)

CW Chart: Chuck Fletcher

The answer to that may rest on how easily NCR can move customers from its existing line of Unix and proprietary minicomputer and mainframe systems to the 3000. Another obstacle, analysts said, will be how successful NCR is at promoting Unix applications that can take advantage of the multiprocessor, loosely coupled, message-passing architecture of the two top levels of the new family.

NCR's customers fall largely in the retail and banking sectors and are composed of two discrete groups: users of the NCR Tower, a Unix machine based on the Motorola, Inc. 68000 microprocessor, and the NCR System 10000 minicomputer and NCR 9800 mainframe.

Clearly hoping to rev up excitement among its current customers while quieting any fears about moving to the System 3000, NCR spent considerable time last week sketching out its migration strategy.

Moving Tower users to the System 3000 should be uneventful, NCR officials promised, because this line already runs Unix.

Regarding 9800 customers, NCR said its 2-year-old Union, a hardware and software product that permits Towers to be connected to a 9800 system bus, will also enable System 3000s to link to a 9800 environment.

System 10000 users, however, must await a new offering termed Galaxy, according to NCR President Gilbert P. Williamson. During the 1990s, Galaxy will allow those customers to use most of their existing applications on top of Unix in the System 3000 — without changes or recompilation. Galaxy is scheduled to be available in the first half of next year.

"I believe it was May '89 that NCR said if you weren't Unix [now] you would be," said Donald K. Whittington, MIS manager at Michigan Sugar Co. in Saginaw, Wis. Michigan Sugar, an NCR customer since 1978, uses the System 10000 running the NCR ITX operating system.

"Migration paths are by far NCR's strongest point," said Whittington, who added that he was excited about the technology and the chance to try relational databases. Likewise, Tower user Richard Lester, vice-president of Information Services at Associated Grocers, Inc. in Seattle, said he was looking forward to "extending the capability of open systems." But Lester said he did not intend to remove the company's IBM-compatible mainframe. "We won't replace the mainframe in the glass house," he concluded, "but we will push operational functions out to relational databases."

Tech challenge

The System 3000's two top levels, the 3600 and 3700, present technological challenges. Both will use loosely coupled parallel architectures using the Intel I486 platform.

The 3600 will use more than one hundred 486s and achieve more than 4,000 million instructions per second (MIPS) performance, NCR said. The 3700 will have thousands of the processors, bus speeds in the tens of gigabytes per second — thanks to an as-yet-unannounced next generation of interconnect systems — and exceed 100,000 MIPS, NCR said.

But Wesley Melling, an analyst at Gartner Group, Inc. in Stamford, Conn., questioned whether the systems up through the 3600 would be appropriate for on-line transaction processing because the architecture has "significant single points of failure." NCR said it will work with database companies and other developers to make the System 3000 a success. Representatives from six leading database vendors pledged to support the System 3000.

NCR executives also said they will use their strategic relationship with Teradata Corp. In April, NCR acquired a 10% stake in Teradata, which has an SQL multiprocessor database management system technology.

"It'll be interesting to see how [NCR's competitors] react," concluded Jim Wegmann, a Tower user and senior vice-president of EDP and systems at Chicago's Talman Home Federal. "If they meet it like-to-like, with the same horsepower and vertical integration, the only winners will be customers."

EMC plans compact discs for mainframes

BY ROSEMARY HAMILTON
CW STAFF

EMC Corp. plans to introduce a mainframe disk subsystem alternative this week that packs 24G bytes of data into a cabinet smaller than the average refrigerator.

The Symmetrix product line is the company's biggest push yet for IBM's large system storage business, and so far some low-end mainframe customers who beta-tested the product give it good reviews.

"I've been impressed," said Brian Johnson, a technical consultant at Arkwright Insurance Co. in Waltham, Mass. "I've seen nothing wrong with it."

EMC is scheduled to release the 24G-byte unit on Tuesday and follow with a 4G-byte unit later this year. It plans to introduce a 256G-byte high-end model in early 1991.

The EMC offering, which the company calls a series of integrated cached disk arrays, is a departure from the current mainframe disk drive units. It loads all the subsystem elements, including controllers, disks and backup battery supplies, into one cabinet.

The basic design relies on 5¼-in. drives that store 1G byte of data each. On their own, these smaller drives cannot match the performance of today's bigger mainframe disk drives. To bring performance up to par with current offerings, the EMC unit uses a processor that provides several high-level functions and a large cache unit that is critical in getting the data to and from the processor at high speeds.

The on-unit processor can emulate an IBM disk drive environment, allowing the EMC unit to attach to a mainframe and fool the operating system into thinking it is just another 3380 or 3390, company officials said. It also provides several key mainframe drive-like functions, such as disk mirroring, which provide fault tolerance of data.

The cache unit, expandable to 4G bytes, can be loaded with large volumes of data, which stay in a ready state until called by the processor. Data can then be delivered at high-speed cache rates instead of the slower rates that would result if a search was required across many small disks.

Because of the different designs, it is difficult to compare the performance of an EMC unit with that of an IBM disk drive. EMC claims to have outdone IBM drives in its own testing. IBM, meanwhile, suggested that disk array technology such as EMC's products cannot provide the high-performance necessary in a transaction processing environment.

EMC's *IBM mainframe-compatible drive array*

However, one apparent advantage of EMC's product is the environmental factor. The unit takes a fraction of the floor space of a mainframe drive, requires no special power supply other than an ordinary wall unit and generates far less heat.

The compact size was a major consideration to Johnson. "If you saw our computer room, you'd know how important [floor space] is," he said. "It would have been almost impossible to add another standard 3380."

Johnson has been testing a Symmetrix Model 4404, which has a capacity of 4G bytes, since last month. While he has not yet committed to it, he said the unit has held up to test runs so far. One job that typically took 45 minutes to complete with IBM drives took only six minutes with the EMC unit, he said.

The EMC device is based on the redundant array of inexpensive disks (RAID) concept, which has been gaining attention in the storage market lately; last week, NCR announced it would use RAID devices in its new systems lineup. EMC also departs from RAID by providing its own integrated cache techniques and other proprietary functions.

To date, there are no full-blown RAID products available, although IBM and most of the storage companies are working on it. EMC's product is an initial RAID implementation, and company officials said future Symmetrix releases will expand on it.

"EMC is bringing out a product that is a forerunner of what the others will do," said Paul Wolfsteater, an analyst at Gartner Group, Inc.

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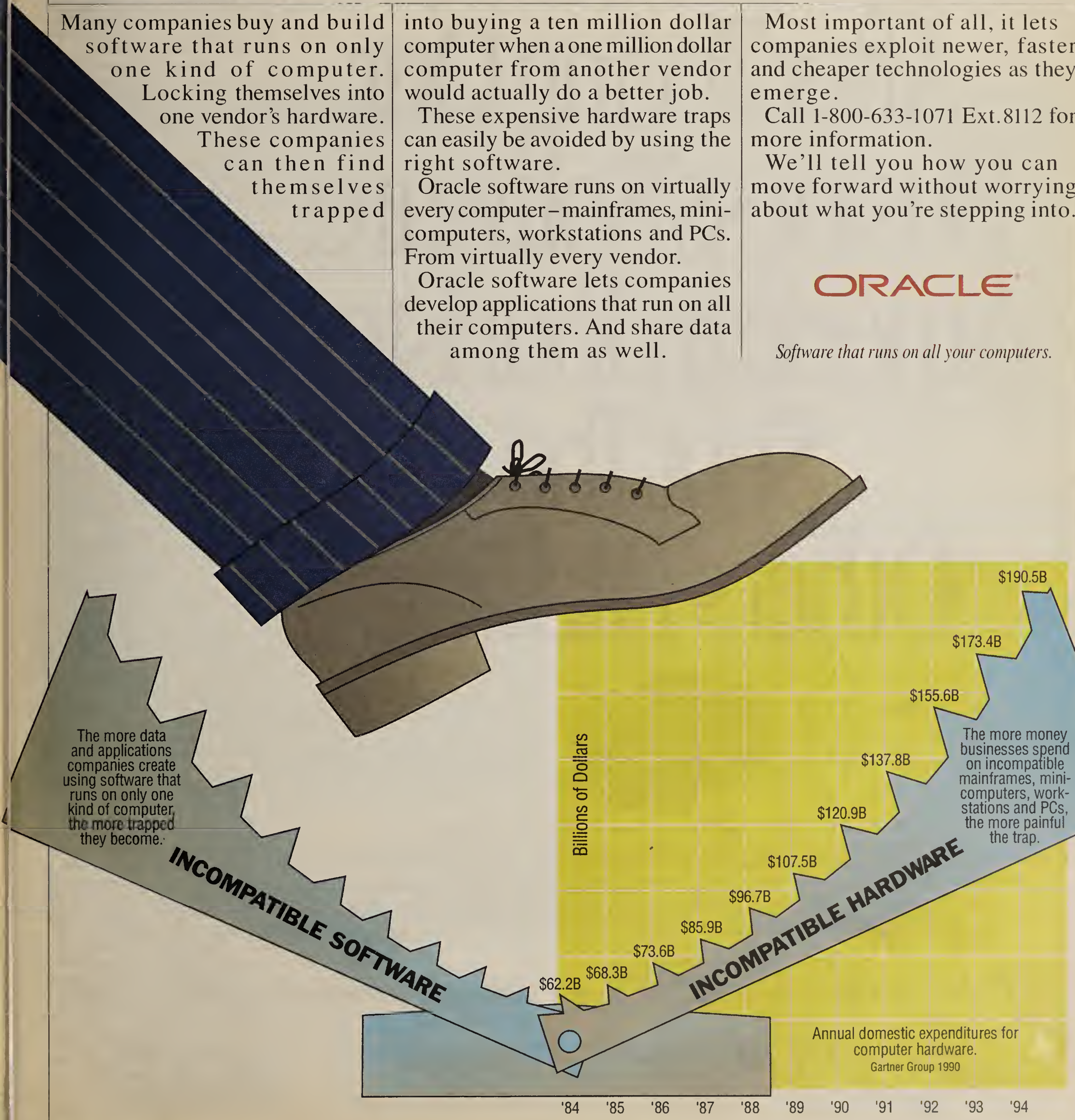

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IBM delivers on OSI promise

BY ELISABETH HORWITT
CW STAFF

NEW YORK — IBM essentially passed the OSI ball to users last week, making good on its promise to deliver the Open Systems Interconnect standard across its major systems, including OS/2 Extended Edition and OS/400.

Several members of the User Alliance for Open Systems spent time last week "trying to sort out how we are going to get these things implemented on our own systems," said David Judson, a senior technology adviser at a U.S. Air Force group.

Among IBM's OSI announcements last week were the following, all of which are said to comply with the Government OSI Profile specifications:

- OSI/Communications Subsystem for OS/2 Extended Edition, which will run on top of the OS/2 Communications Server, providing OSI-to-LU6.2 integration, IBM said. The product will be available next March for $750.
- A statement of direction for OSI Communications Subsystem for the OS/400, which will be available the third quarter of 1991.
- MVS and VM OSI/Communications Subsystem Release 1.1, which supports a direct connection to 802.3 local-area networks with support of other major LAN protocols, including Fiber Distributed Data Interface, IBM said.
- Software that is said to allow IBM's Officevision, Professional Office System and Disoss users to exchange messages with systems that comply with the OSI X.400 electronic mail standard.

"IBM is delivering on those pieces of OSI they said they would deliver [at the] big OSI presentation two years ago," said Steve York, manager of information exchange technologies at Hughes Aircraft Co.

Hughes is interested in using X.400 on its OS/2 servers as a means to interconnect various LAN-based E-mail systems directly, York said.

Not taking chances

Judson's priorities for the Air Force Manufacturing Technology Directorate's Integration Technology Division are to ensure that the new version of IBM's OSI Communications Subsystem complies with the OSI specifications defined by the Corporation for Open Systems' test suite. Such compliance would eliminate the need for a "Band-aid approach" to integrating IBM systems with the division's OSI network, he said.

In a statement of direction, IBM said it would enable an OS/2 server running the OSI Communications Subsystem to act as an OSI gateway for OS/2 workstations on a LAN. This would save users from having to implement the full OSI stack and LU6.2 on the same OS/2 system.

IBM made no commitment to enable its OS/2 or OS/400 system to act as an OSI gateway for a corporate Systems Network Architecture backbone — a boon to firms whose OSI installations are too small to justify a mainframe gateway, said Thomas Nolle, president of consulting firm CIMI Corp.

One question IBM left unanswered was the future roles OSI and LU6.2 will play in linking its systems with non-IBM hosts.

The California Legislative Data Center decided to use a homegrown LU6.2 package as the basis for an architecture to handle data exchange between its IBM and Digital Equipment Corp. systems, said Joe Papa, a systems software specialist at the center. The center could not wait for DEC and IBM to fully support OSI, Papa said.

The IBM Information Network service also announced that it has merged its European Screenmail and U.S. Expedite Mail E-mail service offerings into one X.400-compliant service that links to AT&T, General Electric Information Services, MCI Communications Corp. and U.S. Sprint Communications Co. E-mail services.

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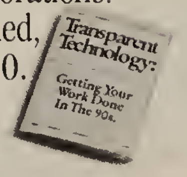

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Outsourcing

CONTINUED FROM PAGE 1

the customers," said Joe Scott, director of East Coast business development at Litton Computer Services, Inc.

At Eastman Kodak Co., whose outsourcing deals with IBM and Digital Equipment Corp. have been the talk of the industry, Vice-President and Director of Corporate IS Katherine Hudson said one software vendor is giving Kodak fits on license transfers. "Ninety-nine percent of our vendors have been just fine in allowing us to switch the license, except for one company that I won't name," she said. "I'm thinking of visiting the company president myself."

Software license transfers have always been an issue in IS shops affected by mergers and acquisitions, but the IS focus on outsourcing during the past year has brought the issue to a head.

In April, CA published a product pricing handbook for its customers to spell out this and other pricing policies (see story below).

"Historically, I think this has been a little confusing to [users]," Shepherd said. "They thought they'd *bought* the product — that's *never* true. We can never let the ownership go because the only asset we have is our software." If outright ownership of the software transferred, he said, legal intellectual property protection would be lost, "and this isn't just CA — it's true for any software company."

The issue gets stickier when the software in question is among the many products that CA has picked up in its acquisition binge of recent years. Scott said CA is seeking fees for Litton customers who want to use Litton's Cullinet Software, Inc. database and manufacturing applications.

"CA has taken a position that third parties are not able to provide use [to customers] without a new license or significant fees," Scott said. "We bought the software a long time ago, and our licenses don't specify anything about that."

Shepherd said that CA has no blanket policy with regard to "grandfathering" of license contracts for acquired products. "We're always open to negotiation," he said.

In at least one instance, a software vendor's insistence that a user buy a new six-figure license for an application caused the user to switch outsourcing vendors to Power Computing, Inc., which already held a service bureau license for that application. The user "was told initially it was no big deal to transfer the license, then the amount kept increasing until it antagonized the customer," said Rich Boswell, national sales manager at Dallas-based Power Computing. He declined to name the software vendor.

"If the fees are sizable, that could sway a decision on whether to outsource," said John Brown, MIS director at AM General in South Bend, Ind., which outsourced IS operations to Pittsburgh-based Genix Enterprises earlier this year.

Users who have outsourced said that software vendors vary widely in their responses to outsourcing situations. "Some will facilitate it, while others make you jump through all kinds of legal hoops," said Herbert Chaplin, vice-president of group IS at American Ultramar Ltd. in Tarrytown, N.Y. "These are the types of things you tend to overlook" in outsourcing decisions, he said. The firm's oil-refining and marketing unit outsourced processing to Power Computing last year.

The license transfer issue has become more acute in recent months. "Two years ago, software vendors seemed more inclined to say, 'Yes, we'll do that for you,' " said outsourcing consultant Rich Schmitt, president of Schmitt Consulting Group, Inc. in St. Louis. "Recently, it has become, 'Yes, we'll do it, but there's a lot of money involved.' "

Software vendor Legent Corp. is currently marketing management support software to IS "so you're better prepared to respond to any outsourcing initiatives," the company said. Notwithstanding that, Legent said it does not take a hard line on license transfers when one of its customers decides to outsource.

"We will lose some licenses . . . [But] in all honesty, what are you going to do?" said Legent director Mario Morino. "Outsourcing is inevitable." And, he added, "The outsourcing vendor is a huge potential client."

Price of doing business

In April, CA published a product pricing handbook to spell out pricing policies for its customers. When a CA product is transferred to a new owner, he must do the following:

- Pay a one-time transfer fee equal to the cost of a current one-year charge for use and maintenance. Industrywide, that figure is roughly 10% to 15% of the current license fee above.
- Pay all outstanding bills owed to CA for any product. "Why should we transfer a license to a company that owes us money?" asked Bryan Shepherd, CA's executive vice-president of marketing.
- Make sure that the IS shop transferring the license has also paid all outstanding invoices to CA.

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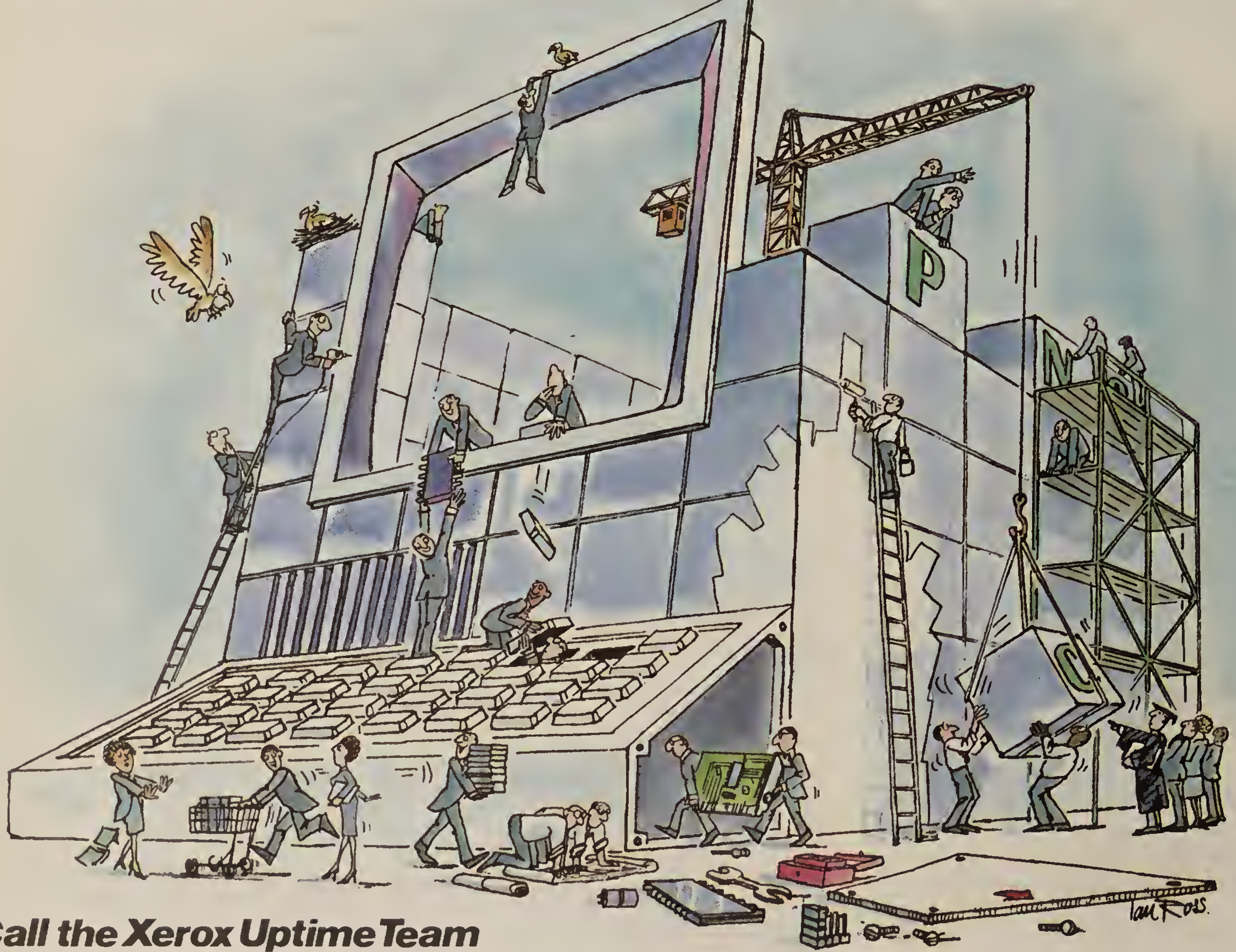

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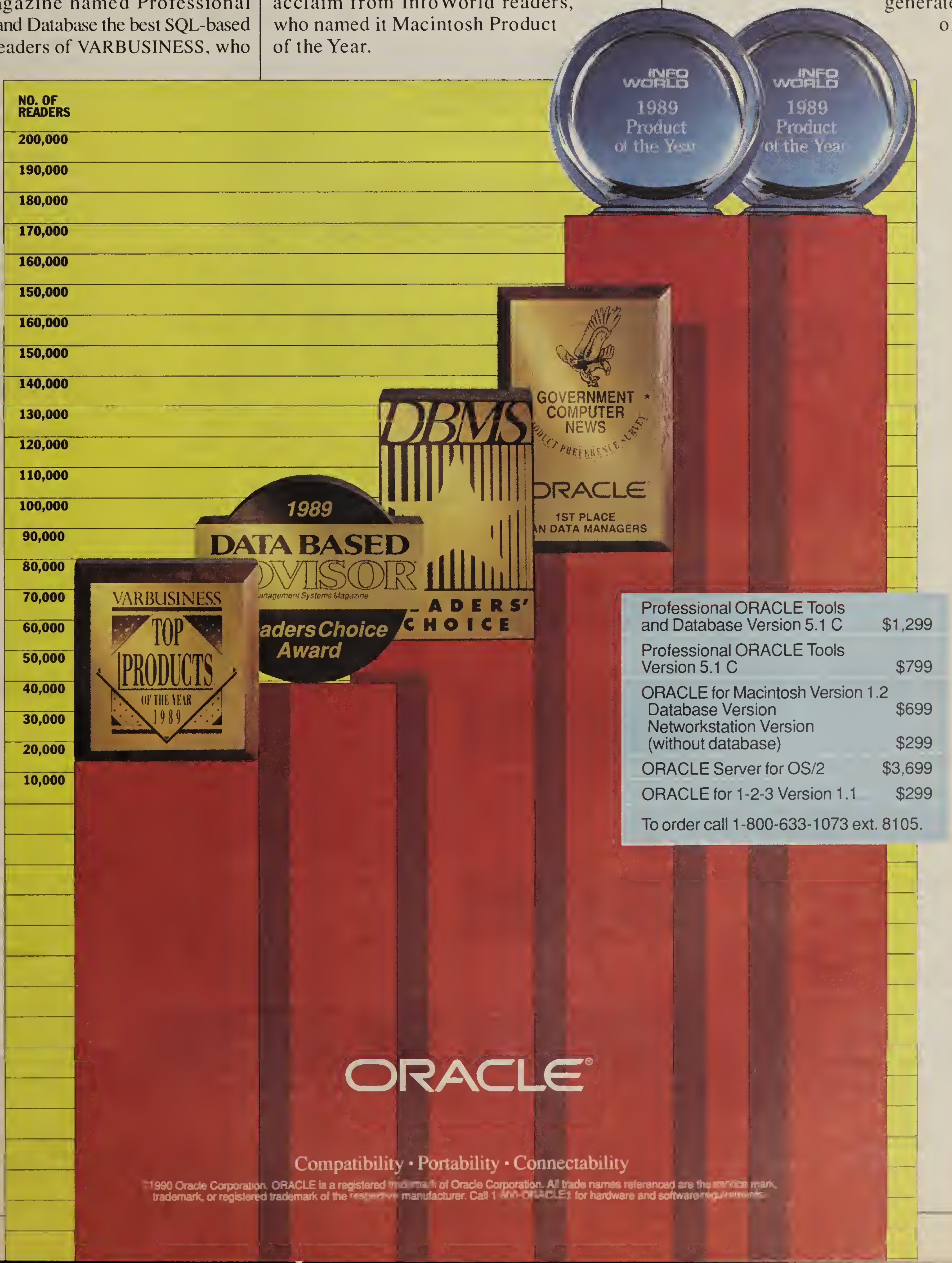

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Xerox software moves to Sun, IBM

BY J. A. SAVAGE
CW STAFF

For years, consumers have been able to obtain innovations in ease-of-use software pioneered by Xerox Corp.'s Palo Alto Research Center on computers made by Apple Computer, Inc., Hewlett-Packard Co. and Xerox itself. Last week, Xerox moved to build on its poor market share by porting its software to Sun Microsystems, Inc.'s Unix-based workstations and the IBM Personal Computer platform.

Called Globalview, the software is much the same as Xerox's product for its proprietary machines, called Viewpoint, which was developed in the early 1980s. Networking, a graphical user interface and text editing is slated to be available with the product in November.

Although there are drawbacks — such as the lack of interoperability with other applications and the need to use Xerox's proprietary server for the workstations — this announcement puts Xerox in a position where other workstation firms claim to be headed in the next few years: heavily network-dependent, commercial work-group computing [CW, Sept. 17]. The software even eclipses Sun's own plans to offer similar products. "We don't believe we have anywhere near the application capability represented by [Xerox]," said Scott McNealy, Sun's chief executive officer.

In the first quarter of next year, Xerox plans to offer three major applications on its Unix systems: document search and retrieval, a manager for collaborative projects and language translation for French, German, Italian, Portuguese and Spanish. However, these applications will require either a Digital Equipment Corp. VAX host, or for translation, an IBM mainframe.

Pricing for the software on a Sun IPC workstation starts at $9,995. An add-in board for OS/2 or DOS PCs is listed at $3,995. The board works with PCs based on Intel Corp.'s 80286, 80386 and I486 processors and includes an Ethernet connector, according to Bill Lowe, executive vice-president and president of development and manufacturing at Xerox.

While acknowledging that Xerox has good technology, Andrew Allison, editor of the "RISC Management Newsletter" in Los Altos, Calif., said it would still be a hard sell. "People are more interested in standards and interoperability than running in a whole new environment."

System 7.0 late — again

CUPERTINO, Calif. — Apple Computer, Inc. repeated a refrain last week that has become unpleasantly familiar to its customers: The arrival of System 7.0 will be delayed again.

Company officials nudged back the scheduled arrival time of the long-delayed operating system by as much as six months, pushing it from the end of this year to the first half of 1991.

Roger Heinen, Apple vice-president of software engineering, said the added time will increase developer feedback and allow a more complete suite of applications to be available when the software finally ships.

Apple officials added that a test version of System 7.0, which developers can begin writing applications to will be available next month.

The operating system, which controls the inner workings of the Macintosh as well as the interface, was first expected to ship last spring. That date was pushed to next month and then to the end of this year.

Heinen added that grumbling users will be well rewarded when the system arrives. "System 7.0 will shatter traditional notions of what personal computers can do," he said.

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	SAA	✓	✓
	NAS		✓
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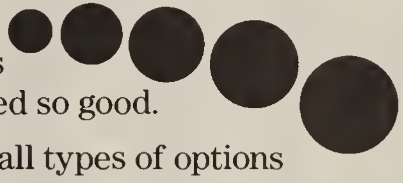

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ADVANCED TECHNOLOGY

TECH TALK

Athena transfers from MIT

■ Athena, the innovative computing environment that was developed at MIT, is expected to be up and running at two other college campuses this fall. North Carolina State University and Iowa State University have signed contracts totaling $7 million with Digital Equipment Corp. to install Athena systems software and link together hundreds of DEC workstations. Students at each campus will be able to use the Unix-based system to access files, software and electronic mail.

Let's work together

■ The National Science Foundation has handed out a total of 11 awards, worth more than $4.5 million, during the second year of its coordination theory and collaboration technology initiative. The objective of the awards is to stimulate multidisciplinary research that could eventually lead to improved understanding of human and machine coordination as well as the technology needed to support collaboration. The awards will support a number of cooperative research projects ranging from a test-bed development for scientific collaboration among a community of biologists to experimental systems for decision support in business settings.

Make way for robots

■ The First International Robot Olympics are scheduled to kick off later this week in Glasgow. In opening ceremonies, a two-wheeled robot will light a torch and carry it through the streets to a sports complex at Strathclyde University, followed by a robot parade. The robot "athletes" will compete in a variety of races (two legs, four legs, wheels and tracks), collision-avoidance tasks, wall-climbing competitions, speech communication skills and swimming events in the university pool. Yes, winners will even receive medals.

Split vote on advanced-tech groups

In the final analysis, predicting the value of new technologies may take a crystal ball

BY MICHAEL ALEXANDER
CW STAFF

A growing number of companies are counting on advanced technology groups to keep an eye on what is coming down the pike, but there is some uncertainty about what role such groups should play in information systems planning.

About half of the 75 corporations that participated in a study released early this year by the Index Group, Inc. in Cambridge, Mass., have formally established advanced technology groups, according to Sarah Kaull, associate director of Index's Prism research service. However, it is unclear from the survey how vital a role advanced technology groups play in those corporations. "Many companies were unclear what their charter is," Kaull said. "They are investigating technology that is not all that new." (See chart.)

"Advanced technology groups get a mixed review," said Norman Weizer, a senior consultant at Arthur D. Little, Inc. in Cambridge, Mass., who specializes in advanced technology forecasting. "The people in them are extremely technology-oriented, and sometimes they get on a favorite hobby horse and try to push the technology into the company. They find a neat solution and then go looking for problems."

It is increasingly important to keep an eye on what is coming down the pike for competitive reasons and be ready to integrate new technology into existing architecture as soon as it becomes commercially viable, said John Lindquist, senior IS manager of technology research at S.C. Johnson & Son, Inc. in Racine, Wis. The company set up its advanced technology group about two years ago. That group in turn advises an executive technology direction committee that ultimately decides whether to adopt a new technology.

Keeping abreast of emerging technology is an integral part of the IS function, but it does not require a dedicated individual or group to do it, several IS managers said.

"We do not have a dedicated group, but I do insist that our top-notch professionals survey new technology and periodically see whether there is an opportunity to deploy it," said Larry Cassity, vice-president of computer services at Ashland Oil, Inc. in Ashland, Ky. "My personal experience with them is that you have a difficult time bringing technology to market. You have folks dedicated to new technology, but they are not in tune with the business; therefore, it becomes an exercise unto itself."

Understanding the needs of a business unit is critical, Lindquist said. Whether the group is able to fulfill its charter is more a matter of corporate culture, he added. "In a formal organization where the culture is driven by protocols and hierarchy, it is difficult to succeed; an informal culture is more likely to succeed." The real key is to involve the business unit in new technology analysis and acquisition from the very beginning.

Linda Bleck

Large corporations with IS departments in excess of 250 members would probably benefit most from a separate technology organization, if for no other reason than to ensure that there is no duplication of effort in analyzing new technology, Cassity said.

Imaging, computer-aided software engineering, object-oriented programming and other technologies are being closely scrutinized at Ashland Oil and have moved from pilot programs into actual use, Cassity said.

The company keeps a eye on technology that appears to be about two years away from becoming commercially viable. Anything beyond that is too speculative because technology changes too rapidly, Cassity said.

Deciding what technology to explore is more a matter of intuition than a clear-cut sense of what the payoff will be in increased productivity, lower costs or any of the other usual measures, several IS managers said.

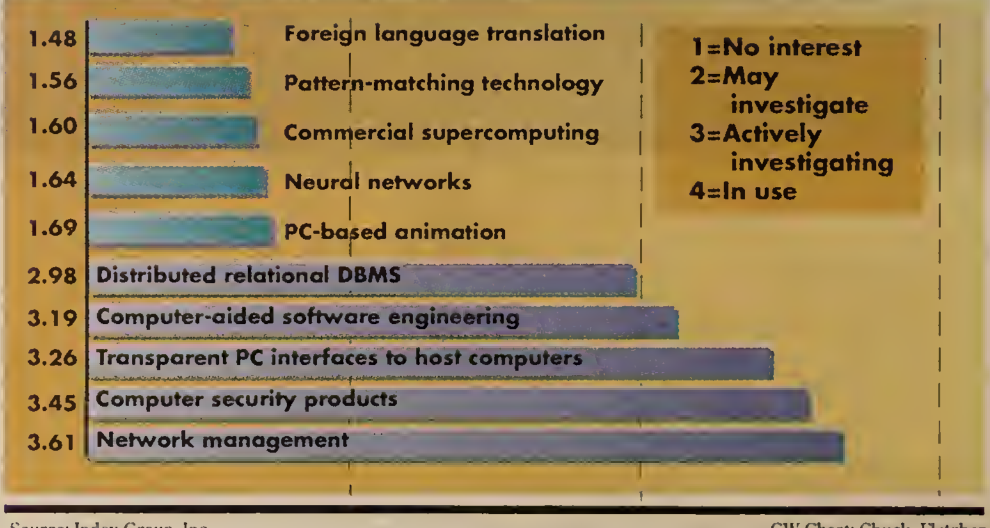
"It's a gut call," said Davis Keyes, second vice-president of marketing technologies at Protective Life Corp. in Birmingham, Ala. Keyes is a member of a group of IS executives that has been mandated to develop a three- to five-year technology plan.

"Take imaging," he said. "If you try to justify it solely on recommendations in cost savings, you're not going to do it. You can say that you anticipate an improvement in customer business, but that is going to be a gut call." If the company can shave two weeks off the time that it takes to approve an insurance policy and put it into effect, customers are probably more likely to buy, he said. What that is worth in dollar amounts "is where the crystal ball comes in."

"We have several different groups that get involved in advanced technology to some degree or another," said Jeffrey Knepper, director of tax technology at Touche Ross & Co. in Washington, D.C.

Knepper is responsible for keeping an eye on emerging technology for the tax consulting practice at his firm. He said that he has counterparts in auditing, management and other practices maintained by Touche Ross. Technology that has "firmwide implications," such as local-area networks are analyzed and decided upon by an advanced technology task force.

"That particular technology is so important to the strategic future of the firm that it warranted a more formal approach," Knepper said. "It did not belong to one group to do all of the work and come up with one standard."

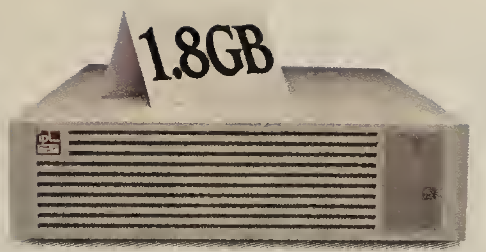


Looking, but not touching

Corporate interest in advanced technology is high, but active test programs are rare

Source: Index Group, Inc.

CW Chart: Chuck Fletcher



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EDITORIAL

All talk, no action

We have an announcement to make.

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Wow, if we could make promises like that and find people gullible enough to believe us, we really would be as big as the big business dailies. And while a "read my lips," made-to-be-broken vow might help someone get elected president, promises and lip service shouldn't form the foundation of something as critical as mainframe buying plans.

What we're talking about is this anachronistic resurgence in one-upmanship from the mainframe vendors. What had become fairly reasonable announcement and delivery schedules are now being pushed to the point of absurdity, clothed neatly in the stock excuse of "needing to show our customers some direction."

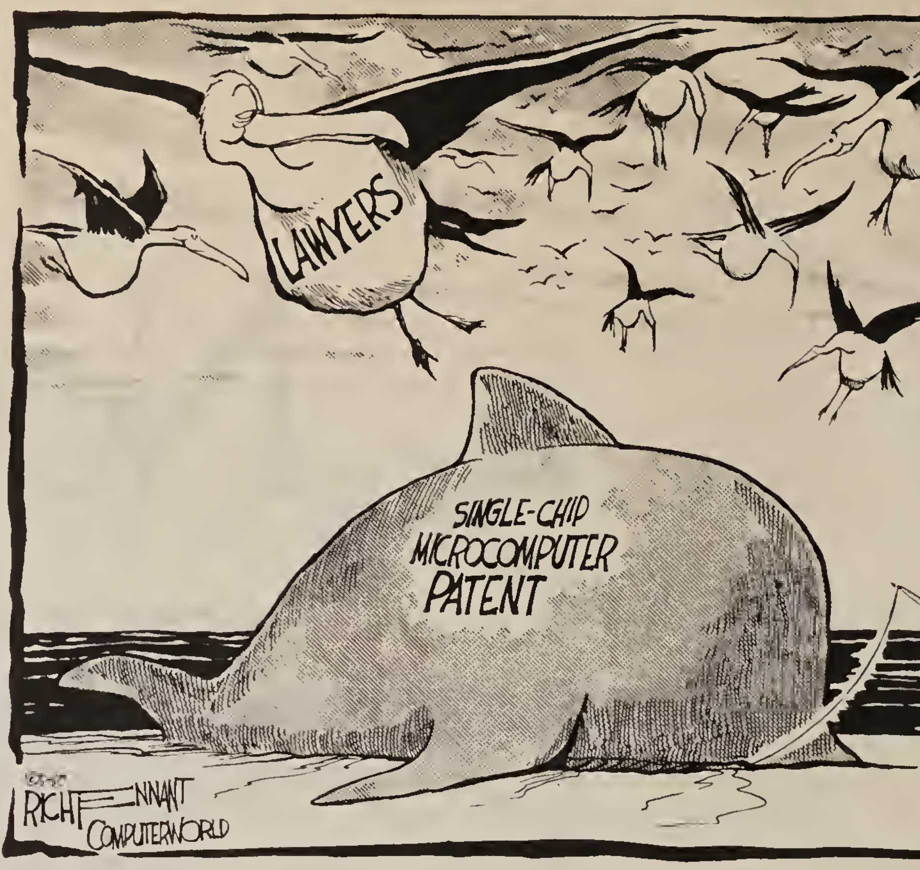
The vendors — Amdahl, Fujistu, Hitachi and IBM — are certainly doing that. They've got their public relations departments working overtime to prove that each is the firstest with the mostest, even though at this point none of them has any significant advantage over the others in terms of what they can actually provide a customer (unless you can take "direction" to the bank, of course).

The fact is that a lot can happen between September 1990 and whenever in 1991 or 1992 the mainframes built around new architectures roll off assembly lines. Ask DEC about unforeseen glitches in producing the VAX 9000, its new mainframe thrust. Ask IBM about the problems it had with some of its 3090s. For that matter, ask any hardware vendor about the many pitfalls that can and often do widen that time chasm between the unveiling of a product and its actual bug-free delivery to customers.

You could say this relapse into the marketeering days of yesteryear was inevitable, given the increasing competition in the IBM-compatible market as shown by a weakening in IBM's market share in the past few years. But does it really serve customers in any meaningful way? Or is it more like so many of these grand architectural schemes and environments (all with catchy little names, by the way) that almost all the big vendors feel compelled to foist onto the buying public?

If market confusion is what the suppliers want to create within the user base, they seem to be doing a good job of that. Now, can they really deliver on all these promises?

We'll certainly be watching. After all, we've got this incredible charter to live up to during the next 18 to 24 months.



LETTERS TO THE EDITOR

4GL fan

In warning us all of the inherent dangers of fourth-generation languages (4GL) — "Beware the dark side of 4GLs" [CW, Aug. 27] — Jonathan Sayles may be overstating his case with respect to data management.

Our company uses the Powerhouse 4GL by Cognos, Inc., and we agree that creating machine-efficient systems is a challenge. But our data is verified by a dictionary and is arguably more reliable than if it were passed around the playing fields of third-generation languages. Our 4GL makes possible projects that we would otherwise be unable to tackle with our limited staff.

Bernard Rice
Programmer/Analyst
Star Publications
Chicago Heights, Ill.

Be the business

We were, unfortunately, not surprised with the results of your latest job satisfaction survey, "Some walls are higher than others" [CW, Sept. 10].

We agree with that issue's editorial, which stated that information systems must take the lead in attacking the frustrating, counterproductive communication problem with senior management and the user community. Specifically, the IS manager must not focus mainly on attempting to educate users about IS issues and initiatives. While this approach will bear fruit over time, why not improve communication more quickly by changing the variable you have more control over: your own behavior.

The IS manager must speak the business person's language and display return-on-investment discipline, strategic vision and the ability to build support across the organization.

How can IS managers keep their sights consistently on business goals and not on the means of achieving those goals? They can do this by talking with users and senior managers in their own language: business benefits. By emphasizing first and foremost the business objectives — improved revenue, profitability or customer service, for example, they can determine to what extent, if any, a technology can help achieve those goals. Communication vastly improves because users and executives are talking about their own areas of major concern and effort.

It is time for the IS community to recognize its true role as business people with expertise in using technology to advance business goals.

Peter S. Karp
President
Jo-Ann Osipow
Manager
Technology Value Assessment
Business Science International, Inc.
Englewood Cliffs, N.J.

Chicago blues

Regarding the Electronic Data Systems Corp. article by Ellis Booker, "EDS speeds Chicago parking ticket collection" [CW, Aug. 27], which noted EDS as the new contractor for the city of Chicago's parking system, your statement "EDS replaces Computil Corp.," needs to be clarified.

The fact that the city of Chicago's administrative procedures for handling parking tickets were old and ineffective would seem to imply that Computil was using an old system to service the contract. It was quite the contrary.

Despite the old administrative system that the city of Chicago was using, we were able to collect more revenue than any of the city's previous vendors.

Ms. Fryklund's comment that Chicago's system is about the worst of any big city is accurate. However, it has nothing to do with our services but rather the ineffective way in which the city managed its parking ticket program.

The new contract requires the vendor to manage and staff the Parking Violations Bureau for the city of Chicago. We are a service bureau that provides data processing services such as traffic processing for municipalities. IBM selected our software to bid for the Chicago contract. We chose not to bid for a facility-type management contract. Unfortunately for Computil, IBM decided to bid a price considerably higher than any of the other vendors that submitted bids, and obviously, EDS won.

I wish the city of Chicago and EDS the best of luck, but the fact remains that Computil collected more revenue than previous vendors and stabilized an antiquated, bureaucratic parking system.

Alfonso J. Izzi
President and Chief Executive Officer
Computil Corp.
Clifton, N.J.

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor In Chief,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701. Fax number: (508) 875-8931; MCI Mail:* COMPUTERWORLD.

IS tasks for the under-30 crowd

MICHAEL B. COHN

We computer folks think we are pretty important. But to my local supermarket, we're chopped liver. I know this because in aisle five, where they keep the magazines, I can barely find the computer stuff. We're buried at ankle level, somewhere between the business stuff and the off-road-four-wheeler stuff. Even worse, we're outnumbered by pro wrestling magazines three to one.

But pro wrestling is not the problem. The problem is women's magazines. Supermarkets carry rows and rows of women's magazines, leaving just half a row for teen magazines, and practically nil for news from Silicon Valley.

Now I'm not complaining about this. Nor am I making some sexist argument, especially while my wife is in charge of our checkbook. But the bottom line is, if you have something important to say, you probably should say it in a women's magazine.

That leaves me in a bit of a jam. I am constantly rejected by women's magazines. They want pieces on health. Careers. Marriage. They do not think relational databases are funny. I've tried to work within their format. I've submitted articles like "Referential integrity on 300 calories a day." Still no takers.

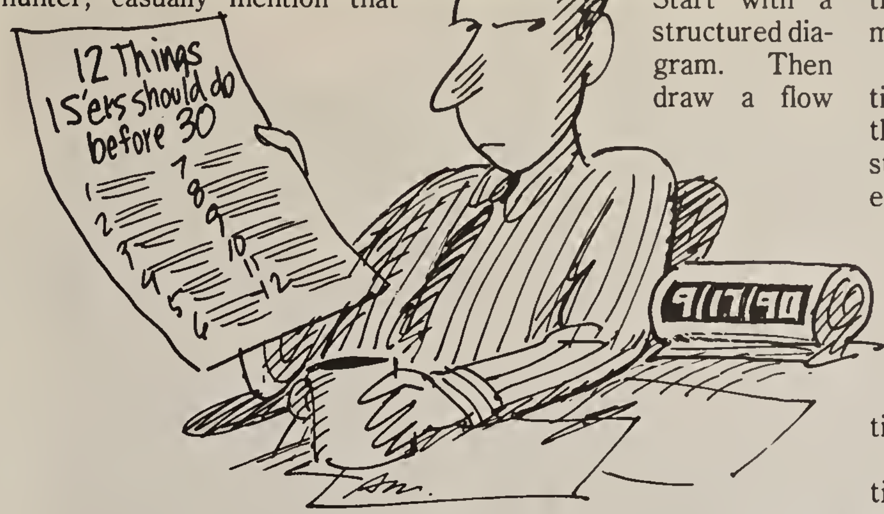
I was not bitter about this until recently, when my cubicle mate pinned up an article from a women's magazine titled "30 things women should do before 30." The list was loaded with acts of daring and romance, such as "learn to skydive" and "get a foot massage from a very gorgeous man."

There were also some fairly cosmopolitan travel goals, career goals, family goals and athletic goals. For anyone to have time for even half the stuff, the foot massage would have to be pretty quick.

So here's my chance to get even. How about "30 things IS-ers should do before 30"? Of course, we probably can't squeeze in all 30 things, either. So let's settle for a dozen, in case a meeting or two runs over.

1. Achieve the impossible. Go to Comdex in Las Vegas and have a hotel clerk actually find your room reservation.

2. Be brave and test the waters. Have lunch with a headhunter, casually mention that you're no longer "technically active" and still, somehow, convince him to pick up the check.



Arthur Matson

3. Get promoted the hard way. Earn it by fixing bugs 60 hours a week. Rise into management, move into your own office and learn what it's like to handle people problems 40 hours a week — while still fixing bugs 60 hours a week.

4. Stand up to the directors of a big, important company. Walk into a project meeting and proclaim, "No! It's too late! I will not change the specs!"

5. Pack up your desk from a big, important company.

6. At least once, "go by the book." Start with a structured diagram. Then draw a flow chart for each major routine. Pseudo-code the whole program, and conduct a structured walkthrough. Code it all (with no GO TOs), attend a code inspection, develop unit test scenarios, stress test every possible logic path and keep a log of all test results. To top it off, finish the thing as close to schedule as possible — or at least a few days before your retirement luncheon.

7. Be a young entrepreneur. Start a PC venture in your garage, build it into a $3 billion-per-year mega-corporation, fall prey to a ruthless internal coup and somehow still find time for JV tennis and the Glee Club.

8. Pay your dues as an IS consultant. Put in three years with the Big Eight in about six months.

9. Set aside uninterrupted time to learn the intricacies of the system — like 48 hours straight, trying to get month-end processing out the door.

10. Appreciate the stress and challenge of working the help desk. Man the phones for at least a week or until you become the "next available representative" — whichever comes first.

11. Experience the satisfaction of finishing a four-year project. Don't tell anyone that it was supposed to be a four-month project.

12. Solve the most puzzling problem that faces IS today: If the PC on your desk has the same power as the computer that took up a whole floor 30 years ago, how come everybody in your department has a cubicle the size of a medicine chest?

Cohn is trying to be a computer salesman in Atlanta.

Universal products: Key to functional integration

PHIL CIOLFI

Many in our industry have pronounced 1990 as the year of integration. Will integration become reality in 1990? Not if the prerequisite for integration is to adopt a standard.

All over the world, computer users enter and re-enter the same information into multiple computer systems. The widespread incompatibility of computer systems and applications software results in a terrible waste of time, poor utilization of human resources and other unnecessary costs.

Conventional wisdom tells us that by adopting a single standard, integration is possible. Unfortunately, just the opposite may be true.

Yes, users can have compatibility across hardware platforms and software applications without needing to radically change the configurations of their existing systems. Now, however, the computer industry is faced with new challenges that will drive standards beyond compatibility at an electronic level to adding value at a strategic level.

In this "new and improved" age, businesses are striving to increase productivity by maximizing the functionality of their computer systems. Implementing a new computer system or augmenting a current system with task-oriented software can provide companies with a significant competitive edge.

In addition, the move toward globalization has created a desire for computing environments to exceed the borders of their organizations. Businesses must be able to share vital information with strategic allies worldwide. In other words, users need functional integration.

Ironically, the existence of multiple standards and the ever-apparent lack of cohesion among standards propagators have caused confusion in the user community and may ultimately become barriers to achieving advanced functionality. What's more, waiting for a standards body or consortium's agreement to adopt one particular standard can cause painful headaches for systems integrators.

The solution to functional integration, therefore, is to create products that are *universal*, not just standard. What's the difference? Universal products allow unrestrained flow of information, whereas standards, by definition, are restrictive.

Standards create a framework in which manufacturers can develop products that achieve varying degrees of compatibility. This allows users to procure new compatible technologies and manufacturers to market to a large user base.

THE SOLUTION TO functional integration, therefore, is to create products that are *universal,* not just standard.

On the other hand, manufacturers are forced to conform to accepted standards during product development — an arrangement that can prevent true state-of-the-art products from ever reaching the marketplace. Worse yet, the alternative to conformity is the introduction to the industry of yet another standard. Unfortunately, both scenarios prevent manufacturers from creating new options and end users from choosing appropriate technology.

Universal products are the answer to the integration needs of the user community. Products in this category are defined as unrestrained because they integrate disparate applications and computing systems without conforming to standards. They also add value by allowing end users to implement their choice of hardware and software, regardless of host requirements.

In addition, they permit manufacturers to utilize innovative technology because it can be integrated into any current user environment. All these elements result in functional integration. If a high level of functionality is achieved, what is declared an industry standard is of minimal interest to the users.

This year, rather than issue a call for a particular integration standard, we should call for products that are universal: i.e., interfaces in modular form designed to link new and existing applications. Defined as Application Interface Software (AIS), these products create a universal environment by linking all applications and systems together regardless of standards.

AIS is a new software category that embraces the concept of universality. It is positioned to address the marketing goals of the manufacturer and the functionality issues of the end user. Using AIS, manufacturers can develop revolutionary, unique stand-alone products that can be integrated across varying platforms.

AIS bridges various applications with an interface program that is built using a simple, macro-like language. This language controls the information transfer. Integration is performed as it captures, interprets, packages and delivers information from one application to another.

Using AIS with front-end products, developers are free to create innovative, integrated applications. Existing applications that already comply with a standard can also be integrated with AIS. Ultimately, this capability will allow users to more effectively employ anticipated standard applications such as Systems Application Architecture-compliant software and the derivative of the Open Software Foundation.

AIS products separate the innovative technology from the vehicle that makes the technology transferable. That way, the manufacturer's product becomes universal without the restrictions imposed by standards. Manufacturers benefit by selling more products, and users benefit by being able to integrate desirable applications and systems that will generate increased productivity.

Growth in the computer business is fostered by innovation. Let's not ask manufacturers to write a symphony, then tell them they have to write it in the key of C. Universal software opens the door to creative development.

Ciolfi is president and founder of Selecterm, a terminal leasing and software company based in Danvers, Mass.

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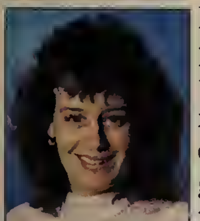
COMMENTARY

Rosemary Hamilton

Sorting the fallout



IBM's Enterprise System/9000 announcement was one of the biggest events in the company's history and consisted of a few hundred new products and prices.

What's the value of this? The sheer size of it certainly made the point that IBM was taking a big step in the large systems market. It gave customers a boost to think that IBM had such a comprehensive plan.

But there is a downside for customers, too. Throughout the last few weeks, customers have been sorting through huge stacks of letters and talking to their sales representatives.

The goal here is to figure out exactly what has been announced — never mind what it means. As simple a goal as that may sound, it has not been easy.

Some users said it will take at least a month before they can begin putting together a plan of action. Others initially got inaccurate information, either by word of mouth or just by missing pieces of the announcement. One customer contacted after the announcement was upset because, as he understood things, the 9370s were shut out from the ES/9000 family. Another believed that the ES/9000 Model 720, which is based on a 3090 600J engine, would feature the new processor technology, which has commonly been referred to as Summit.

Continued on page 33

Auto club maps imaging route

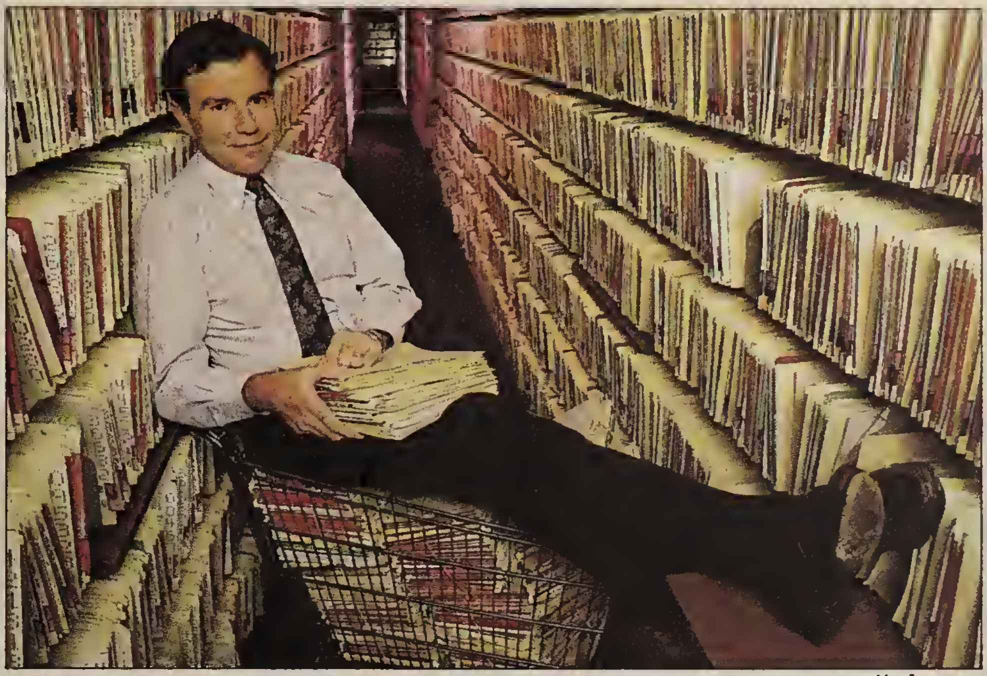
ON SITE

BY JEAN S. BOZMAN
CW STAFF

COSTA MESA, Calif. — Southern California is well known for its streams of cars winding along interstates and jamming city freeways, traveling in all directions under the bright California sun. Not as well known are the mountains of paperwork these vehicles generate in the form of insurance policies and accident claims.

That is something the $1 billion Auto Club of Southern California knows all too well, since it holds 600,000 policies for 1 million cars owned by its 3.6 million members. Each day, there are 33,000 more pieces of paper to file at this American Automobile Association affiliate, one of the nation's three largest auto clubs.

There is a light at the end of this traffic tunnel, though. About 18 months ago, the group decided to deploy IBM's Imageplus electronic imaging storage and retrieval system. The club's new Image Capture Optical Network (ICON) uses an IBM 3090 mainframe as a giant file server. "This is a place where centralized processing really does make sense," said C.L. Murray, group manager of data processing. "All the information has to be available to all the offices."



Alan Levenson

Auto Club's Murray *expects to save $2 million per year with imaging*

For all the storage problems they cause, the 45 million pieces of paper in active files and 75 million pieces in inactive files cannot be tucked away and forgotten. They must be shared with the club's 80 branch offices in 13 counties. Under the old paper-based system, headquarters employees had to access the master paper files. However, since the master file could not leave headquarters, the document had to be photocopied or sent through electronic mail to one of 3,500 IBM 3270 terminals scattered throughout the organization.

Dozens of Bell & Howell scanners convert paper documents into numbered electronic files. An index is then stored in IBM's IMS database. For the sake of end users, these computerized folders can be opened up on-screen and read like a paper file.

"You want to keep track of documents in a file folder, just like you would do it manually," Murray said. "The difference now is that the work flow is electronic rather than mechanical."

Scanned document images will be staged through active disk-drive memory for eight to 10 days. The final resting place for documents will be a set of 2G-byte optical platters that can be archived on racks, dramatically reducing the need for shelf space. ICON's optical drive, also called a "jukebox" because of the way it stores optical discs, is manufactured by Filenet Corp., also in Costa Mesa, and is resold to customers by IBM.

Imageplus is costly to implement, largely because it relies on high-end mainframe horsepower

Continued on page 33

Third parties add AS/400 backup options

BY MARYFRAN JOHNSON
CW STAFF

Storage and tape backup options for IBM's midrange Application System/400 recently broadened with "intelligent" backup tape systems from American International Devices, Inc. and a new disk drive from IPL Systems, Inc.

American International last week unveiled a tape system and tape array using reduced instruction set computing (RISC) processors — similar to those in IBM's RISC System/6000 workstation and server line — for diagnostics and other functions, such as unattended backup and tape quality testing.

The AI/T490 Intelligent Tape System is a ½-in. cartridge system that is compatible with the IBM 3480/3490 products and priced at $47,600 for a 1.4G-byte model.

Its data transfer rate of 3M byte/sec. is the same as IBM's 3490 tape drive.

American International's single-drive model has a 200M-byte capacity, while the dual-drive model has 400M bytes. Either system can be enhanced with one or two automatic cartridge stack loaders, which hold up to seven 200M-byte cartridges each, for a total system capacity of 2.8G bytes of unattended backup.

Also introduced was the AI/T366 Intelligent Tape Array, which contains three 8mm drives operating as one logical drive at a combined transfer rate of 716K byte/sec. It provides 6.6G bytes of unattended backup.

IPL Systems' officials announced the 7636 Disk Array, a 1.8G-byte disk array for IBM AS/400 models B30 to B70.

Priced at $15,000, $22,800 and $30,600, the three IPL models feature IBM-manufactured disks and are available immediately in rack-mounted and tabletop configurations.

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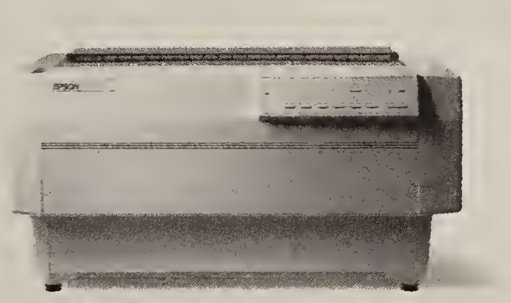

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While few printers can match the sheer speed of the DFX-8000, even fewer can match the ease with which it handles. Productivity-enhancing conveniences include Epson's advanced Smart-Park™ paper handling, dual paper feeds and an optional automatic paper cutter, plus other useful features rarely found on line printers.

As with every Epson, compatibility and reliability are a foregone conclusion. The DFX-8000 will easily connect to your PCs, minis and mainframes, and will run day after day without the least bit of trouble.

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A Comparison Chart of the Major Cooperative Processing Software Products:

FUNCTIONS:	SUPER-LINK®	Easel™	Mozart™	Arbiter®	IBM's HLLAPI™	IBM'S APPC™
Processing Topologies Supported						
Peer-to-Peer Processing	✓			✓		✓
Existing terminal-based systems	✓	✓	✓		✓	
Mixed Peer-to-Peer and existing systems	✓					
Application integrity/Software Distribution	✓		some			
SAA/CUA Interface compatibility	✓	✓	some			
Workstation Environments Supported						
PC/DOS	✓	✓	✓	✓	✓	✓
OS/2	✓	✓	✓	✓	✓	✓
PC/DOS to OS/2 application compatibility	✓		?			
LAN Server for shared applications and data	✓		?			
Multiple transaction servers on a LAN	✓					
Development Environment Comparison						
Object orientation	✓	some				
Dictionary and documentation	✓					
Panel/Form painter for creation/maintenance	✓	✓	some			
3270 screen capture: picture and attributes	✓					
CASE/Application Generation	✓	✓				
Intelligent (language-sensitive) editor	✓					
System and user-defined reusable code templates	✓					
Integrated compile/test/debug	✓	✓				
Execution time source debugging	✓	some				
All development tools for DOS available in DOS	✓		✓			
Objects Supported						
CUA display images	✓	✓				
CUA dialog within display object	✓					
Validation within display object	✓					
Help processing	✓					
Error processing	✓					
Text window interactions	✓	some				
Business graphics	✓	✓				
3270 definition	✓					
Interactions with 3270	✓					
Interactions with Peer-to-Peer	✓					
"Logon" Scripts	✓					
Application integrity/Software Distribution	✓					
Local Data Access						
Indexed files	✓		✓			
dBase	✓		✓			
Flat Files (random access)	✓					
Flat Files (sequential access)	✓	✓	✓			
Multiple read/write to files on LAN Servers	✓					
High Level Functions Directly Available in the Language						
Field-level context sensitive help	✓		✓			
Optional user learning mode	✓					
Display and selection from:						
Indexed files	✓		✓			
Sequential files	✓	✓	✓			
In-memory lists	✓	✓	✓			
Menu display and selection	✓		✓			
Determining 3270 screen identification	✓		✓			
Read/write to 3270 in a single command	✓					
Read/write to 3270 one field at a time	✓	✓	✓			
Determine dynamic 3270 attribute changes	✓					
Embedded user assistance (pop-up selection lists)	✓					
Data editing/validation:						
Data type/mark checking	✓		✓			
Single range/limit check	✓		✓			
Field/data driven range/limit check	✓					
Date formatting/validation	✓		✓			
Validation against local and LAN files	✓					
Required fields	✓		✓			
"Must Fill" fields	✓					
Zero not valid fields	✓		✓			
Peer to Peer Host Environments Supported						
MVS-CICS	✓			✓		✓
MVS-IDMS/DC	✓					
MVS/TSO	✓					
DOS/VSE-CICS	✓			✓		
VM/CMS	✓			✓		✓
DEC VAX/VMS	✓					
Software Distribution Host Environments Supported						
MVS-CICS	✓		✓			
MVS-IDMS/DC	✓					
MVS/TSO	✓					
DOS/VSE-CICS	✓					
VM/CMS	✓					
DEC VAX/VMS	✓					

Every effort to present an accurate chart has been made, however no guarantee can be made (1/2/90). Super-Link® is a registered trademark of Multi Soft, Inc., Lawrenceville, NJ. Mozart™ is a trademark of Aspen Research. Easel™ is a trademark of Interactive Images, Inc. Arbiter® is a registered trademark of Tangram Systems.

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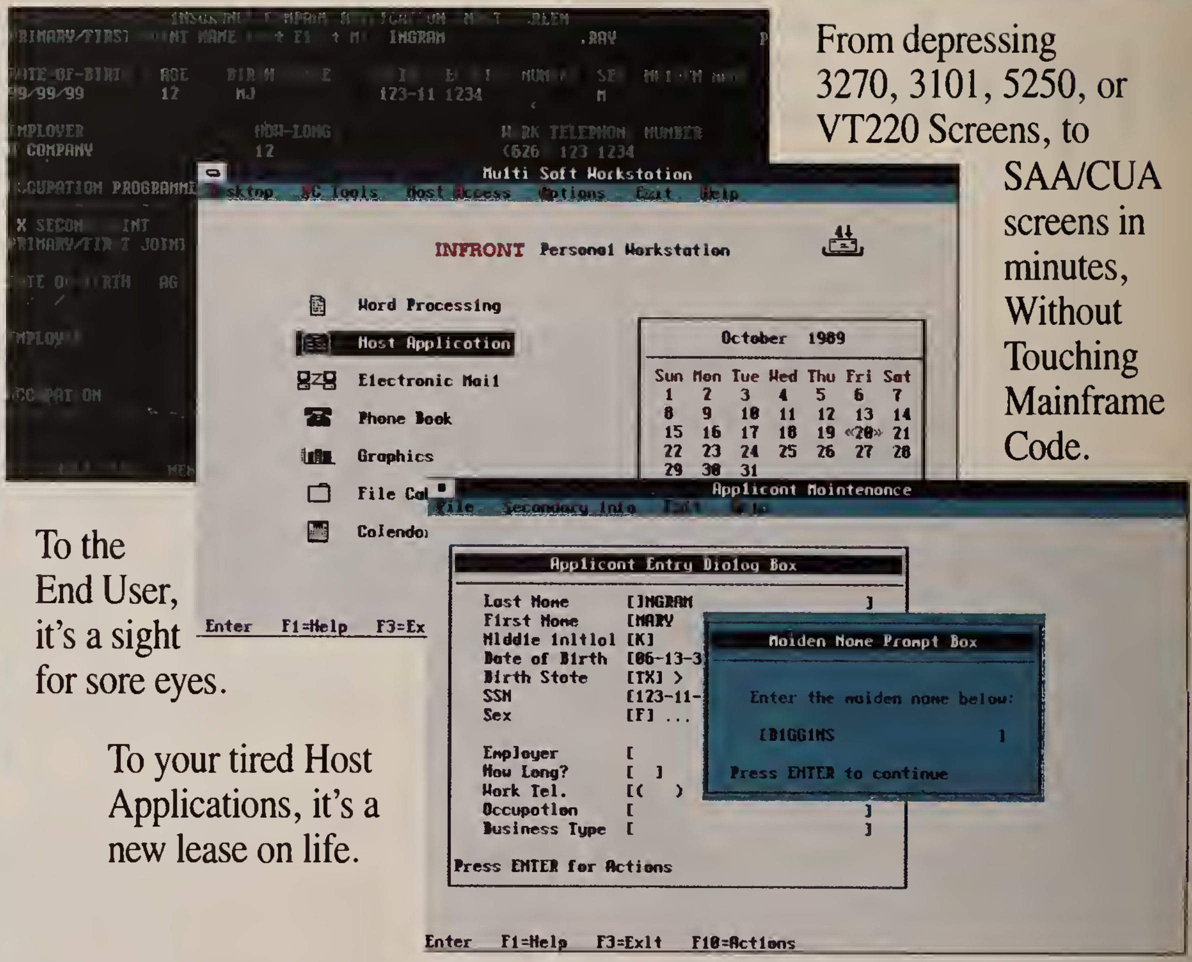

```
October   1989

Sun Mon Tue Wed Thu Fri Sat
 1   2   3   4   5   6   7
 8   9   10  11  12  13  14
 15  16  17  18  19 «20» 21
 22  23  24  25  26  27  28
 29  30  31
```

```
Applicant Entry Dialog Box

Last Name        [INGRAM                    ]
First Name       [MARY
Middle Initial   [K]
Date of Birth    [06-13-3
Birth State      [TX] >
SSN              [123-11-
Sex              [F] ...

Employer         [
How Long?        [  ]
Work Tel.        [(    )
Occupation       [                          ]
Business Type    [                          ]

Press ENTER for Actions
```

```
Maiden Name Prompt Box

Enter the maiden name below:

[BIGGINS                 ]

Press ENTER to continue
```

```
Enter   F1=Help   F3=Exit   F10=Actions
```

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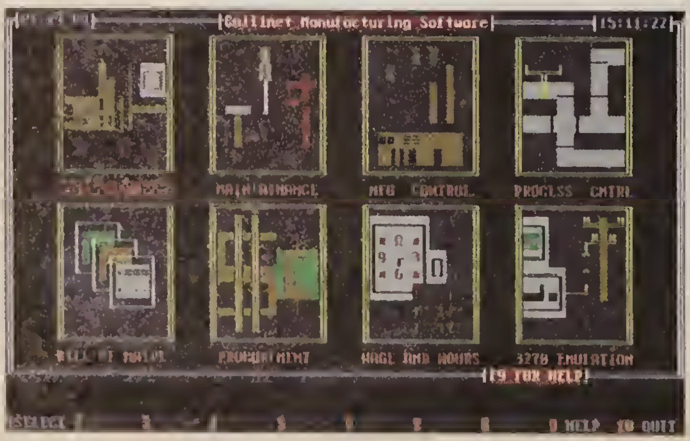

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Pittsburgh: Bullish on IS future

ON SITE

BY SALLY CUSACK
CW STAFF

PITTSBURGH — Once enveloped by smokestacks and factories, Pittsburgh is now striving to be known for its universities, sporting events, beautiful parks and world-class museums. Behind its new cultural facade, the city depends on an intricate web of hardware and software to maintain its municipal departments and public facilities.

Pittsburgh values *information technology*

The political climate often affects decision-making in the public sector, and "each municipality has its own peculiarities and requirements with reference to applications and software," observed Wendy S. Bell, assistant manager at City Information Systems. "We're fortunate, however, as we have a city administration that values the use of information technology." During the last three years, the city has aggressively supported the move toward end-user computing by approving more purchases of personal computers and office systems.

To integrate its 15 separate municipal divisions, Pittsburgh depends on a Bull HN Information Systems, Inc. Bull 8000 running under the Gcos8 Release SR3000 operating environment. The dual-processor mainframe communicates with 15 Bull DPS6 minicomputers scattered throughout the city, servicing some 2,000 end users on a daily basis over direct and twisted-pair cables for local lines. Bell estimated that there are more than 200 PCs connected to various DPS6s and indicated that the city is working to link up a stand-alone Unisys Corp. machine currently being used as a vehicle fleet management system.

A Bull customer for more than a decade, Ed Walkowski, manager at City Information Systems, said he feels that a single vendor strategy creates an easier environment in which to develop software and implement communications. He said he also feels confident that Bull's efforts in open systems integration will allow the city's IS to bring in other vendors.

Most of the city's applications are written in-house, especially at the mainframe level. Much of it is written with an eye toward doing work from remote locations via the network. There are more than 40 applications on the mainframe, including packages for cash management, refuse truck routing, traffic court and ticketing, pension and personnel and payroll functions. Pittsburgh also utilizes Bull's Office One Plus for electronic mail communications on a citywide basis, and the service is invaluable, Walkowski said.

"We're starting to develop applications based on E-mail, particularly in the area of official documentation for legislative correspondence, and the system has dramatically reduced our hard-copy interoffice communications," he said.

Walkowski added that the E-mail software resides on each minicomputer and his department is busy linking the midranges together — a joint effort between in-house staff and Bull technicians. "The HDLC network was basically in place," he noted, "[so] it's more a matter of assigning name nodes on the Datanets and doing some software work on each Level 6."

The different divisions most frequently access the time collection module portion of the personnel and payroll system, Walkowski said. Most users also take advantage of office automation applications running on the individual departmental computers. The 8000 processes each request for information via the Datanet front-end communications processor and uses a fourth-generation language compiler to generate reports. The city currently runs Bull's DM4TP hierarchical database, which allows the minicomputers to function in on-line, terminal emulation mode to access all production databases.

Over the years, City Information Systems has recruited employees from other departments throughout the city in order to "help us move forward and meet our customer needs," Walkowski said. Hearkening back to his early days at the data center, he recalled that the structure was then "people-dependent." He observed that although data processing staff numbers have remained static during the past 20 years, productivity has dramatically increased. "We're always looking at technology to improve the work force," he said.

Imaging and micrographics booming

BY ELLIS BOOKER
CW STAFF

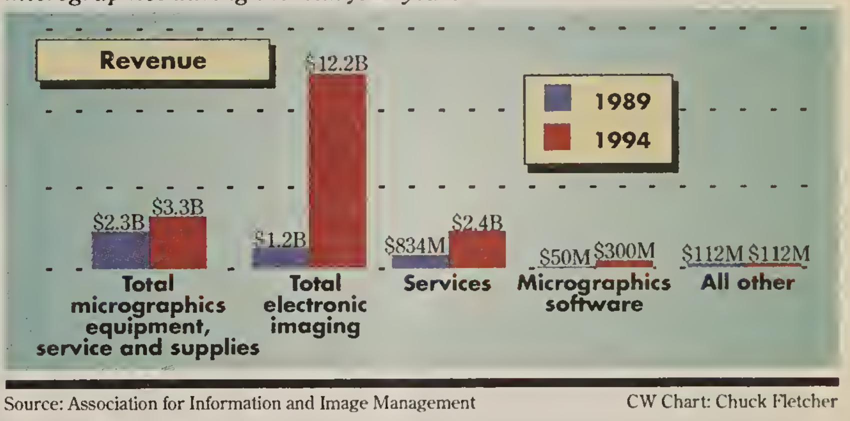
The imaging and micrographics marketplace was worth $4.3 billion last year and will grow at a compound annual rate of 34% during the next five years, said a recent survey by the Association for Information and Image Management (AIIM).

In addition to surveying 96 of its trade members, Silver Spring, Md.-based AIIM approached 726 end-user companies. These users, the study reported, currently plan to spend about equal amounts on micrographics and electronic imaging.

The users also expressed concern over what they perceive as impediments to imaging today. The relatively high cost of electronic imaging remained an issue for these users. Another concern was the lack of standardization among vendors and the need for applications beyond storage and retrieval. Users also called for greater interaction among various imaging and micrographic technologies.

Zoom time

Electronic imaging is expected to surpass and then overwhelm micrographics during the next four years



Source: Association for Information and Image Management

CW Chart: Chuck Fletcher

In the study, entitled "Information and Image Management: The State of the Industry, 1990," AIIM trade members reported revenues of $1.2 billion in electronic imaging and $2.3 billion from micrographics systems. The remaining revenues included $634 million for image management services and $112 million in miscellaneous sales.

Revenue grew 28% over last year, the study stated, noting that "the adoption of electronic imaging, in particular, will be more cautious in 1990 through 1992, then increase significantly in later years."

Overall, the research projects worldwide information- and image-management revenue to climb to nearly $20 billion by 1994. Three years ago, a Coopers & Lybrand study commissioned by AIIM predicted the market would grow to $6.5 billion by 1996 [CW, March 30, 1987]. The current report was produced by Temple, Barker and Sloane, Inc.

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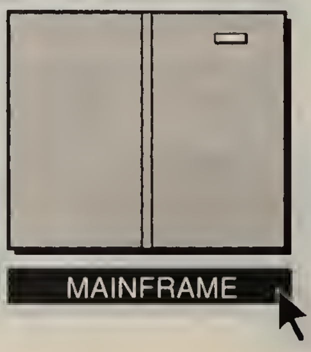

Not only does Macintosh connect into all environments, but Apple's Data Access Language makes it possible for your users to request and update information from host databases—regardless of what type of network technology, host system architecture, or DBMS they are using.

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*PC WEEK, May 7, 1990. **Direct LocalTalk connections dependent on NetWare 386 NLM due Fall, 1990. Macintosh connection achieved today via standard bridges.

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Beacon extends VSAM functions

BY MAURA J. HARRINGTON
CW STAFF

BOSTON — Beacon Software International recently introduced its first software product designed to give added functionality to IBM's VSAM data management system.

CICS Connection allows multiple programs to update the same VSAM file and provides simultaneous on-line and batch access, said Beacon President and Chief Executive Officer Robert Mushinski.

CICS Connection is able to do this, he added, by centralizing the batch and online I/O requests through VSAM and giving total control of I/O activity of both batch and on-line programs to CICS, thus allowing both types of programs to update the same VSAM.

Under VSAM, the batch program would normally have to own the file rather than let CICS control the process — as CICS does for on-line programs by keeping track of the I/O activity for each file, Mushinski said.

Other features in CICS Connection include the ability of the user to control the number of simultaneous requests sent to VSAM and the time increments in which they are sent, Mushinski said.

"[CICS Connection] does essentially the same thing [as a database management system] in terms of concurrency capabilities and is an alternative for users who don't have the time or money to integrate a database management system into their computer system," Muchinski said.

The product can also act as a stopgap measure to allow both on-line and batch programs to update the same VSAM file while a DBMS is being developed.

CICS Connection is available at an introductory price of $45,000 per site license.

Fujitsu adds fault-tolerant CPU

BY LORI VALIGRA
IDG NEWS SERVICE

TOKYO — In its third major product announcement in less than a month, Fujitsu Ltd. recently ventured further into multivendor computer environments and international markets with a new fault-tolerant communications processor that supports a variety of communications protocols, including IBM's Systems Network Architecture (SNA).

Fujitsu expects to sell 2,000 of the Sure System 2000s in the first three years of sales — 1,500 to the domestic market and another 500 to multivendor system sites overseas. That underscores Fujitsu's international market positioning, which started in earnest during the past year or so.

Earlier, the company introduced a version of AT&T's Unix System V for its supercomputers and M series mainframes that will enable Fujitsu to sell its computers more easily overseas. Then it brought out a super fast mainframe series that will compete with IBM's Enterprise System/9000 mainframes.

Fujitsu has set up an expansive working environment for its communications processor: It supports such standard protocols as SNA, Open Systems Interconnect, Transmission Control Protocol/Internet Protocol, Fujitsu Network Architecture (a variation on IBM's Systems Application Architecture) and the Japan Chainstore Association network.

The System 2000 is aimed at customers in the global money market, automatic banking services and credit-card cashing services that need all-day operation and the ability to upgrade their systems during operation. It also eliminates the need to use an M series mainframe as a hot backup machine.

The product is the first communications processor to be introduced within Fujitsu's Multienvironment Information System Solution from under the Domain Concept architecture umbrella introduced with last week's high-end mainframes. The System 2000 is currently available in five models ranging from two- to six-processor modules with monthly hardware rental fees ranging from $9,000 to $19,667. The SXO operating system costs $1,537 per month.

Lori Valigra is the Tokyo bureau chief for the IDG News Service.

Imaging

CONTINUED FROM PAGE 25

and large disk drives to make the system hum. ICON has already cost $3 million for the initial investment in equipment and software, which is a significant part of the club's annual IS budget of more than $20 million.

However, the payoff may not be far off. "If we didn't expect to be saving $2 million a year by 1993," Murray said, "we wouldn't be doing it."

ICON will use one-fourth the capacity of the club's IBM 3090 Model 200 — soon to be upgraded to a Model 400 — and one-third of its 120G bytes of hard-disk capacity. "This is a very data-intensive technology that's redefining the way we do capacity planning," said Frank Bereznay, the club's manager of technical services. Imageplus users must have MVS/ESA, since the program uses the PR/SM memory-allocation facility and the Systems Managed Storage facility.

Architecturally, ICON is a kind of client/server application, one in which the "server" is the mainframe and the "client" is an IBM Personal System/2 Model 55, specially outfitted with compression/decompression cards that reduce the 467K bytes of data on a scanned document to 80K bytes per page. The PS/2 workstations, priced at $8,500 each, use oversized display monitors to show the forms' fine print.

The club started writing applications for the ICON system in 1989 and was one of the first nine sites to implement Imageplus on an early support program from IBM. A small-scale production test of ICON, using just 5,000 club member accounts, began in February. A full-blown production system is scheduled to come on-line in December.

The December switch coincides with IBM's shipment of Imageplus Version 2.0, announced on Sept. 5.

Version 2.0 reportedly consolidates all image storage in IBM's DB2 relational database, including support for the indexing of file folders. New application programming interfaces will allow users to tie existing MVS/ESA applications into the Imageplus system, an IBM spokeswoman said. Support for storage of color images will also be shipped in December, IBM said.

Hamilton

CONTINUED FROM PAGE 25

These are just the basics of the announcement. Never mind the challenge presented by all those other customer letters — the ones not mentioned on announcement day — such as a cryptic note concerning price cuts on selected memory features for 3090s.

It is a difficult task for customers to get an understanding of this package, and IBM needs to make an extra effort to provide information as clearly as possible. However, at times it has seemed that IBM overwhelmed even itself with the volume of product information it released.

Take the matter of mainframe upgrades. At the IBM ES/9000 announcement in early September, an IBM executive mentioned 3090J model upgrade price breaks for 3090 base, E and S model users. That made sense. It seems obvious that IBM would want to move users to the new platform or up the 3090 line as soon as possible.

But when another executive was asked about the price breaks a week later, he insisted that no such policy existed.

A follow-up conversation with an IBM spokesman corrected the second executive's remarks. It turns out that there have been upgrade incentive policies in place, and they will continue to be available until the end of this month. The policies vary, but one example is a plan that allows a low-end 3090E user to upgrade to a J model in two steps at the price of a one-step upgrade, which is typically less expensive.

In between these conversations, another item came up that truly confused matters. It seems IBM also issued a customer letter on Sept. 5 for price increases on 3090 model upgrades to J processors. When an IBM spokesman was asked about this, he said he was not familiar with this particular customer letter.

So, what do we learn here? That IBM executives are human, too, and that they are still absorbing some of the nitty-gritty details of the announcement? I suspect users will understand — up to a point.

IBM, after all, made the decision to deliver such a big package to the market. Now it's up to IBM to provide information as straight as possible, so customers can get on with their jobs of making decisions.

Hamilton is *Computerworld's* senior editor, systems and software.

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NEW PRODUCTS — SOFTWARE

Computer-aided software engineering

Direct Technology Ltd. has announced Automator QA, a test system designed to create intelligent processes (agents) that automate software testing procedures.

The product resides in a personal computer that is linked to a host. It is said to reduce the time needed to create an application for testing character-based software running on mainframes or minicomputers by a ratio of 3 to 1. Its QA View and QA Report features enable users to view failures in different screens or analyze data. Built-in clocks are also included.

An entry-level system costs $5,495.

Direct Technology
10 E. 21st St.
New York, N.Y. 10010
(212) 475-2747

Utilities

Demax Software, Inc. has announced a product designed to process disk configurations — known as striped disks — which are used primarily by Digital Equipment Corp. VAX 9000 machines.

The Squeezepack defragmenter can make fragmented files contiguous and consolidate free space to minimize the number of disk accesses.

Prices range from $245 to $3,395, depending on VAX configuration.

Demax Software
999 Baker Way
San Mateo, Calif. 94404
(800) 283-3629

Applications packages

Applied Software, Inc. has announced Almost TSO, an MVS VTAM application environment that supports multiple users per address space executing TSO applications such as ISPF, SDSF and DB2.

Almost TSO can be used to convert most TSO applications to VTAM by changing the log-on from TSO to Almost TSO. It can be used to implement interactive applications that ordinarily require CICS, the company said.

The product is available for MVS/SP, MVS/XA and MVS/ESA systems. It costs between $12,000 and $25,000.

Applied Software
P.O. Box 13027
840 U.S. Highway No. 1
N. Palm Beach, Fla. 33408
(407) 626-4818

Advanced Data Management, Inc. has announced a software package designed to allow users of IBM mainframes and compatibles to schedule batch jobs for processing at a later time or on a recurring basis.

The Personal Job Scheduler enables developers to compile and test new systems while using fewer millions of instructions per second. Other features include job queuing; the ability to list, delete or modify pending jobs; and automatic event notification.

The product can run on machines equipped with IBM's MVS/XA or MVS/ESA with TSO. It costs $10,000 per CPU.

Advanced Data Management
15 Main St.
Kingston, N.J. 08528
(609) 799-4600

Compilers

Telesoft has announced an Ada cross compiler designed for developing embedded real-time applications with Motorola, Inc. 88000 reduced instruction set computing-based processors on Digital Equipment Corp. VAX/VMS hosts.

The Telegen 2 cross compiler includes a multithreaded run-time support package that provides deterministic interrupt latency behavior for real-time embedded applications.

The product is priced between $12,600 and $102,000, depending on configuration.

Telesoft
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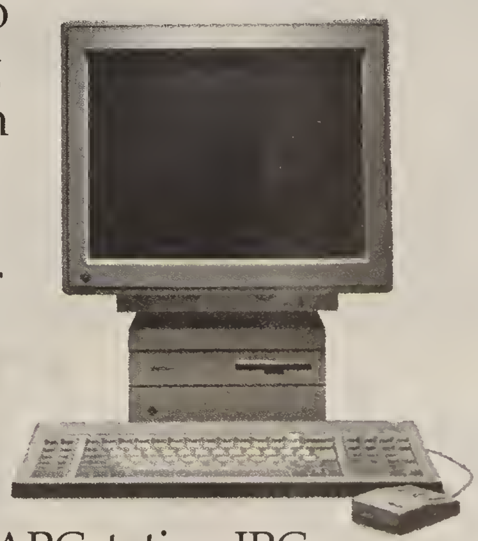

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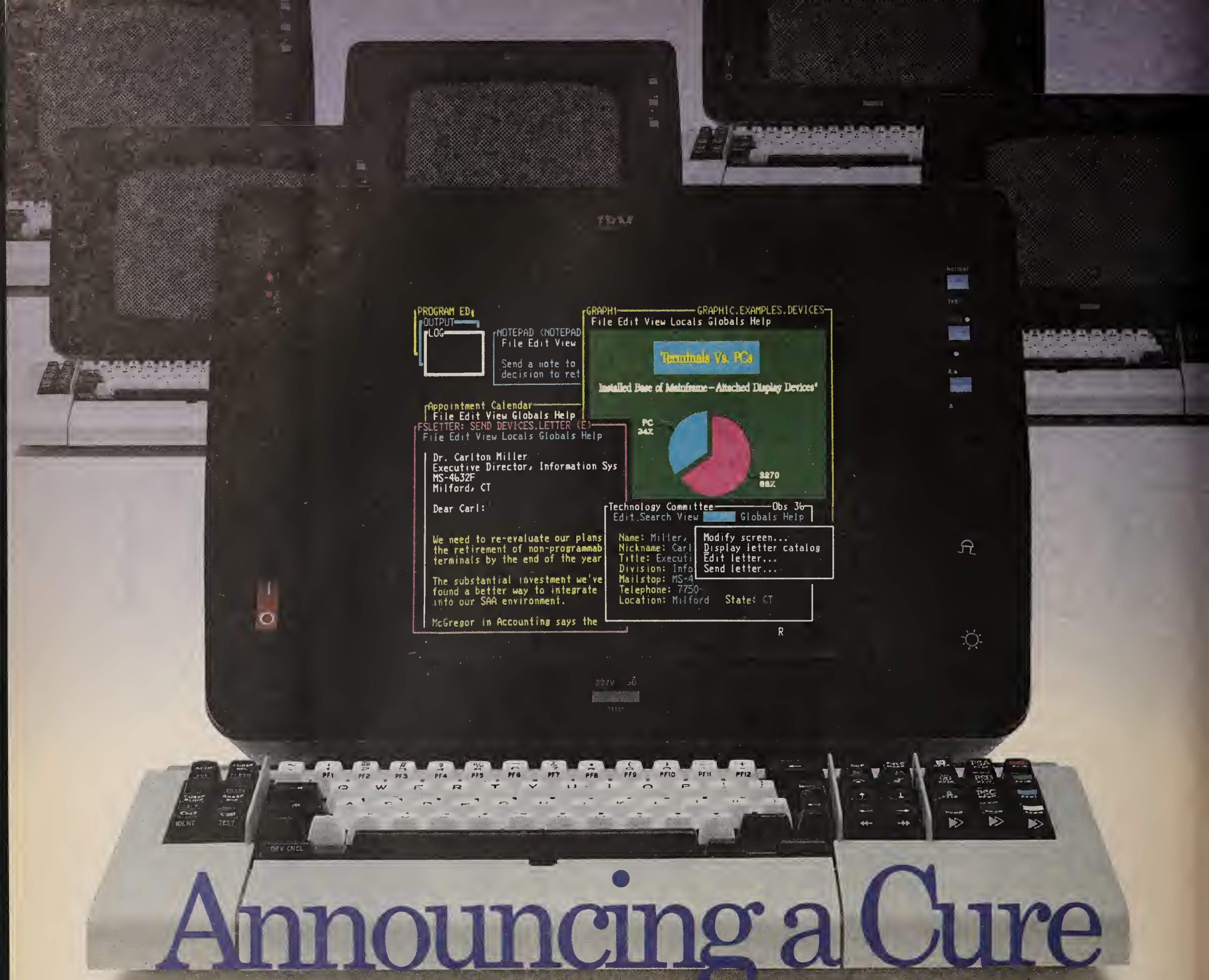
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Dr. Carlton Miller
Executive Director, Information Sys
MS-4632F
Milford, CT
Dear Carl:
We need to re-evaluate our plans
the retirement of non-programmab
terminals by the end of the year
The substantial investment we've
found a better way to integrate
into our SAA environment.
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IDC WHITE PAPER

Image Management Systems

EXECUTIVE SUMMARY

With corporate icons such as American Express Co., Citicorp and Federal Express Corp. realizing savings of 20% and more through the use of image management systems, widespread use of the technology seems likely to occur in the near future.

While some of the best known applications include processing checks and credit card receipts, image systems are also specifically designed for engineering drawings, mapping systems and general business forms. They coexist with other complementary technologies such as optical character recognition (OCR), microform – microfiche and microfilm – and electronic data interchange.

Dating back to the late '60s, image management systems were originally designed to make paper documents available for on-line display and retrieval. As the systems evolved, however, that philosophy gave way to the currently accepted concept of automating the entire paper handling process.

Beginning with Wang's entry in 1987, the major systems vendors started rapidly lining up behind image systems. Unisys Corp., IBM, Digital Equipment Corp., Hewlett Packard Co. and NCR Corp. have joined this segment of the market. Another company, FileNet Corp., played a pioneering role in developing turnkey image systems.

The third party market has also blossomed. These vendors can customize basic systems for a particular application, concentrate on one part of the system, such as OCR, or provide the components of the system platform. This flexibility has attracted the attention of the major systems vendors, many of whom have signed deals with multiple third party firms.

Image systems will continue to stimulate the development of computer technology as they force users to upgrade their management systems.

IDC stresses the competitive advantages to be gained from image management system implementation and urges users to investigate their promise and invest in their use.

IMAGE MANAGEMENT SYSTEMS

AN IDC WHITE PAPER FOR INFORMATION SYSTEMS MANAGEMENT

INTRODUCTION: WHAT IMAGE MANAGEMENT SYSTEMS CAN DO FOR YOU

HOW IMAGE SYSTEMS WORK
- Scanners
- Indexing
- System Performance

A BRIEF HISTORY OF THE IMAGE MANAGEMENT SYSTEMS INDUSTRY
- Microform Moves Aside
- The Software Evolution

TYPES OF IMAGE SYSTEMS
- General Business Systems
- Item Processing Systems
- Engineering Drawing Systems
- Mapping Systems

COMPLEMENTARY TECHNOLOGIES
- Optical Character Recognition
- Microform
- Electronic Data Interchange

VALUE, FUNCTIONS AND BENEFITS OF IMAGING
- Why are Image Systems Strategic?
- High-Value Applications
- The American Express Paradigm
- Key Functions and Benefits
- Digitizing Documents at the Earliest Possible Point
- Electronic Routing
- Digitization
- Reducing Data Entry Errors
- Facilitating Business System Redesign
- Reducing Physical Storage Space
- Reducing Document Retrieval Time
- Improving Document and System Security
- Improving Management and Government Report Capabilities
- Providing a Productivity Measuring Tool
- Eliminating "Knowledge-based Downtime"

THE SYSTEMS VENDORS

THE ROLE OF THIRD PARTIES

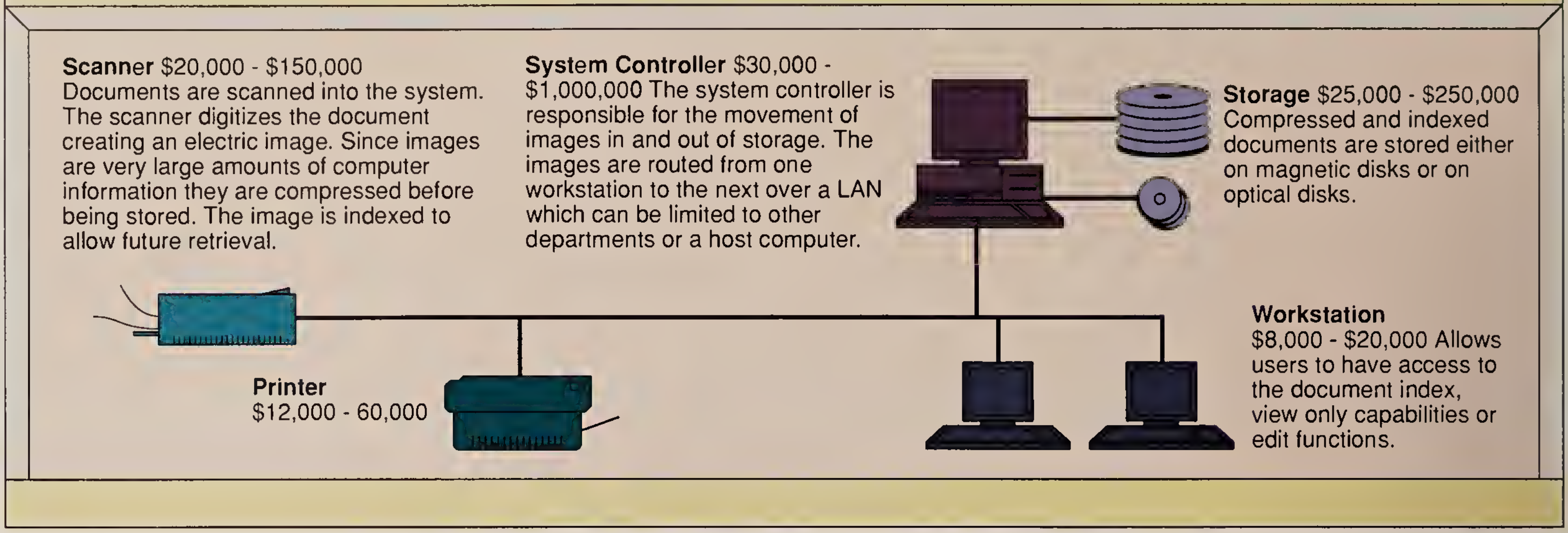
A USER'S GUIDE TO THE MOST COMMON MISTAKES

TRENDS AND ISSUES
- Standards
- Future Technological Developments

IMAGE MANAGEMENT SYSTEMS

THE GREAT TECHNOLOGICAL QUEST FOR THE MYTHICAL PAPERLESS OFFICE MAY FINALLY BE LAID TO REST. IMAGE MANAGEMENT SYSTEMS HAVE COME NOT TO SLAY THE PAPER BEAST BUT TO TAME IT. ALLIED WITH ON-LINE TRANSACTION PROCESSING, RECORD MANAGEMENT AND OTHER OFFICE SYSTEM TECHNOLOGIES, IMAGING WILL IRREVERSIBLY CHANGE THE NATURE OF THE WHITE-COLLAR WORKPLACE. ■ TO DATE, IMAGE SYSTEMS HAVE DELIVERED PRODUCTIVITY GAINS EXCEEDING 20% AND PROVIDED SIGNIFICANT COMPETITIVE ADVANTAGES TO COMPANIES SUCH AS AMERICAN EXPRESS CO., CITICORP, FEDERAL EXPRESS CORP. AND CONSOLIDATED FREIGHT. ■ IMAGE MANAGEMENT SYSTEMS AND IMAGE PRO-

Image management systems components



Scanner $20,000 - $150,000
Documents are scanned into the system. The scanner digitizes the document creating an electric image. Since images are very large amounts of computer information they are compressed before being stored. The image is indexed to allow future retrieval.

System Controller $30,000 - $1,000,000 The system controller is responsible for the movement of images in and out of storage. The images are routed from one workstation to the next over a LAN which can be limited to other departments or a host computer.

Storage $25,000 - $250,000 Compressed and indexed documents are stored either on magnetic disks or on optical disks.

Workstation
$8,000 - $20,000 Allows users to have access to the document index, view only capabilities or edit functions.

Printer
$12,000 - 60,000

A typical image management system may range in price from $95,000 to $1,285,060 depending on configuration.

cessing are the two most common terms used to describe a system that allows users to digitize a business document and move the image of that document from one workstation to the next for more effective processing. This technology is easy to use but requires careful planning if its potential is to be fully realized. This paper will show how users who implement their systems wisely reap the many benefits they offer.

And those benefits are extensive. They range from reducing data entry errors, to streamlining information flows within organizations, to reducing physical storage space. In the digital world of image management systems, users can greatly increase the speed and efficiency of processing a wide variety of documents, including checks, credit card statements and insurance policies, to name but a few.

Just as there is a wealth of applications, there is also a variety of systems that run them. Although general business documents like job applications and item processing documents like checks come to mind first, there are also systems dedicated to engineering drawings and mapping applications. The common thread that links them is their ability to allow people to work faster and better.

Like so many computer-based technologies, image management systems date back to the mid-1960s. Those early systems gave way to more modern analog systems in 1978 and their digital successors debuted in 1982. Now major systems vendors and third party firms are combining their skills to offer the most advanced products - products that can have a direct impact on the tens of billions of dollars businesses spend on paper-based systems every year.

Although the worldwide market for image management systems has been slow to grow, IDC predicts it will reach $25 to $35 billion by the late '90s. By that time, the need for data entry, which is arduous and error-prone, will have diminished dramatically.

There are two prominent misconceptions about image management systems. The first is that they portend the end of paper-based offices. This is not the case. What they offer is a more streamlined work flow for paper-based offices. The second misconception is that image management technology is the same as optical disk technology. This is also wrong. Optical disk technology is an enabling storage technology for image management systems and as such only a subset.

This discussion of image management systems provides the reader with an understanding of how image management systems work, their history, the various types of systems and high-value applications. It also describes system functions and benefits, the roles of vendors, the most common user mistakes, standards and future technological developments.

HOW IMAGE SYSTEMS WORK

In terms of hardware, an image management system is normally composed of a combination of scanners, workstations, servers, storage and printers in a network. Basic software includes a database management system for image indexing and software to run each of the hardware components. Depending upon the specific application requirements, some vendors also offer a microfilm camera and microfilm storage as an option.

In a typical system, a general business document is fed into the scanner much in the same way documents are used with copier and facsimile machines. The scanner then reduces the document to a series of 1s —commonly refered to as on-bits—to a dark area of the document or 0s—to a white portion of the document.

As a result, the image appears to the computer as an unintelligible series of bits. The computer can't search for a specific word or phrase since the document is an image as opposed to a text file. Therefore, to retrieve the image, users have to assign specific index information, either manually or automatically, so the computer can identify it.

A data compression process ignores white space between letters and stores the dots comprising them. Depending on the compression technique used, this reduces the number of bits stored to a range from 15-to-1 to 50-to-1. Despite the use of advanced compression techniques, a bit-mapped image can consume 500K bytes or more. As a result, image management system users frequently require very large amounts of computer storage, storage which can be relatively economical when based on optical disk. Magnetic disk storage costs $8 per megabyte, while optical-disk storage costs only $1 per megabyte.

If users want to retrieve a document, they enter index information into their workstations. The workstations send that information to a database management server, which in turn relays the request to the storage portion of the system. When the request is fulfilled, the images are sent back over the network to the user workstation. Finally, the image of the document is decompressed before it is displayed on the workstation screen.

Scanners

There is a broad range of scanners to meet the demand for multiple applications. They offer varying rates of resolution. The resolution of a scanner is the clarity or level of definition provided for the scanned image. This is generally defined as dots per inch; each dot is called a pixel. The majority of scanners use 200-, 240- or 300 dot/in. In order to increase resolution, scanning time, image size and required storage must also be increased. The amount of processing power required to decompress and compress the image also grows.

The major vendors selling the scanners do not usually manufacture them. As a result, many scanner interfaces are incompatible with their counterparts from other companies. This means vendors must write specific software drivers for almost every scanner they support. Because this is time-consuming and expensive, vendors limit the number of scanners they support.

Of all the components in a system, scanners have the highest rate of failure. IDC recommends that users have a backup scanner available at all times. Users should also specify in the purchase contract the time in hours it will take the vendor to repair the original or install the backup.

Indexing

Indexing is critical to image management systems and one of their biggest benefits. In paper-based systems, indexing is generally limited to one field, e.g., the notation tab of a file folder. Image management systems are more flexible, allowing multiple methods of retrieval, e.g., by name, account number, date of application, etc. Each additional index field offers another way to access a document. However, this increased accessibility also increases the amount of manual keying required to enter the document into the system. Further, more index fields add to the total index size, increasing general system overhead.

System Performance

Although, as mentioned, a scanned image may range in size up to 500K bytes or more, conventional computer architectures are designed to handle 4K bytes and smaller blocks of data. This inconsistency has made it very difficult to blend display technology, workstations, networks, DBMSs and storage in an eloquent form, and has slowed product development.

Image management system performance is difficult to assess on a general basis. Because there are many individual factors that affect performance, it should only be judged on an application-by-application basis.

A BRIEF HISTORY OF THE IMAGE MANAGEMENT SYSTEMS INDUSTRY

The image management systems industry was initially pioneered by system integrators such as Litton Integrated Automation and TRW Financial Systems.All the early market factors created an ideal environment for systems integrators. The technology was strategic for many large U.S. corporations, the applications were unique from one industry to the next, the technology was generally unavailable and system requirements were substantially different from one company to the next.

During the late '70s and early '80s, the integrators managed to install relatively dramatic demonstrations of the technology at companies such as Federal Express, Emery Air Freight and Boeing. The focus of the integrators was on basic hardware and software capabilities for scanning images, displaying them effectively and integrating leading-edge components. These early systems were designed to make "paper" documents available for on-line display and retrieval, as opposed to automating the entire paper process.

Meanwhile, the traditional vendors of microfilm products such as Eastman Kodak, Bell & Howell and 3M feared that as the price of storage fell, many companies would bypass microfilm and elect to store their records on a more accessible on-line medium such as optical disk. It was from this defensive posture that all three companies began investing substantial resources in developing image systems—systems that largely mimicked their existing products but replaced microfilm and microfiche with optical disk technology.

Microform Moves Aside

This represented an historic transition, as microfilm and microfiche—together known as microform—had been time-tested and economical archival methods for more than 25 years.

The vital point is, once a document has reached the records management area, all active processing has already been accomplished. Records management exists because legal or business requirements demand some documents be maintained for extensive periods of time, e.g., 30 years for a typical mortgage. Some government records must be saved for as long as 100 years. Retrieval rates vary depending on the type of application. Microfilm is the least expensive storage medium for central repositories of documents that have completed the processing cycle and are not likely to be retrieved soon or often.

The first company to realize just how far-reaching document processing technology could be was formed in the early '80s. FileNet Corp. introduced the first turnkey image management system in 1984, a system that featured optical disk storage with gigabyte capacity. It followed up with a workflow software package. The optical disk storage was a new way to digitize business information—95% of which still exists on paper despite the advancements of the computer age and office automation. But, FileNet said at the time, paper was still the most appropriate storage medium for the vast majority of information. It felt the best way to process that paper was with workflow software, which automatically moves data from one processing step to the next.

The Software Evolution

Today, work-in-progress software has built on the base of workflow software and become a key element in image management systems. This software is designed to automatically reactivate processing when previously missing information becomes available.

As a current example, a major U.S. oil company spent several months reviewing its accounts payable application and determined that adding image capabilities would produce tremendous savings in data entry, ease of access to original documents and increased specialization in processing accounts.

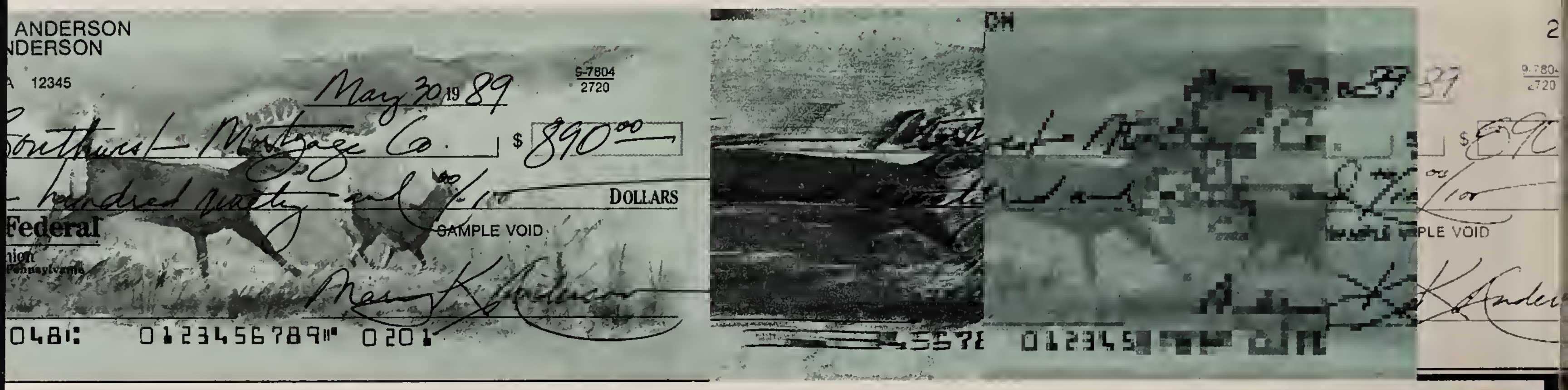
At that time, the average cost of processing a transaction, including all hardware and software, was less than $20. This was in an environment where necessary documentation was not always available for processing. This meant the process frequently bogged down while additional documentation needed to complete the transaction was located.

The cost of processing these transactions with missing documents was almost eight times higher than a straightforward transaction. A simple calculation revealed that almost 60% of the oil company's accounting department costs were contained in the management of these accounts. Simply put, the cost of work in progress was killing them. And this company had the most sophisticated IBM mainframe available and a multi-million dollar investment in accounting software.

By adding an image management system with excellent work-in-progress software, the oil company was able to reduce its transaction processing costs by almost 30%

IMAGING: THE BIG PICTURE

Flexibility and business vision will shape imaging in the 1990s.



Did you know that if you loaded all the documentation relating to a Boeing 747 – all the designs, the mechanical drawings, the operations manual and so forth – onto an actual 747, the plane wouldn't be able to get off the ground? The sheer weight of the paper – some 450,000 pounds – would well exceed the maximum allowable load.

That's essentially what is happening in the business world today: Companies and governments are being weighed down by paper. All too often, they find themselves having to manage thousands, even millions, of new documents each year. As a result, they spend vast amounts of time and money simply shuffling the paper needed to support their business activities.

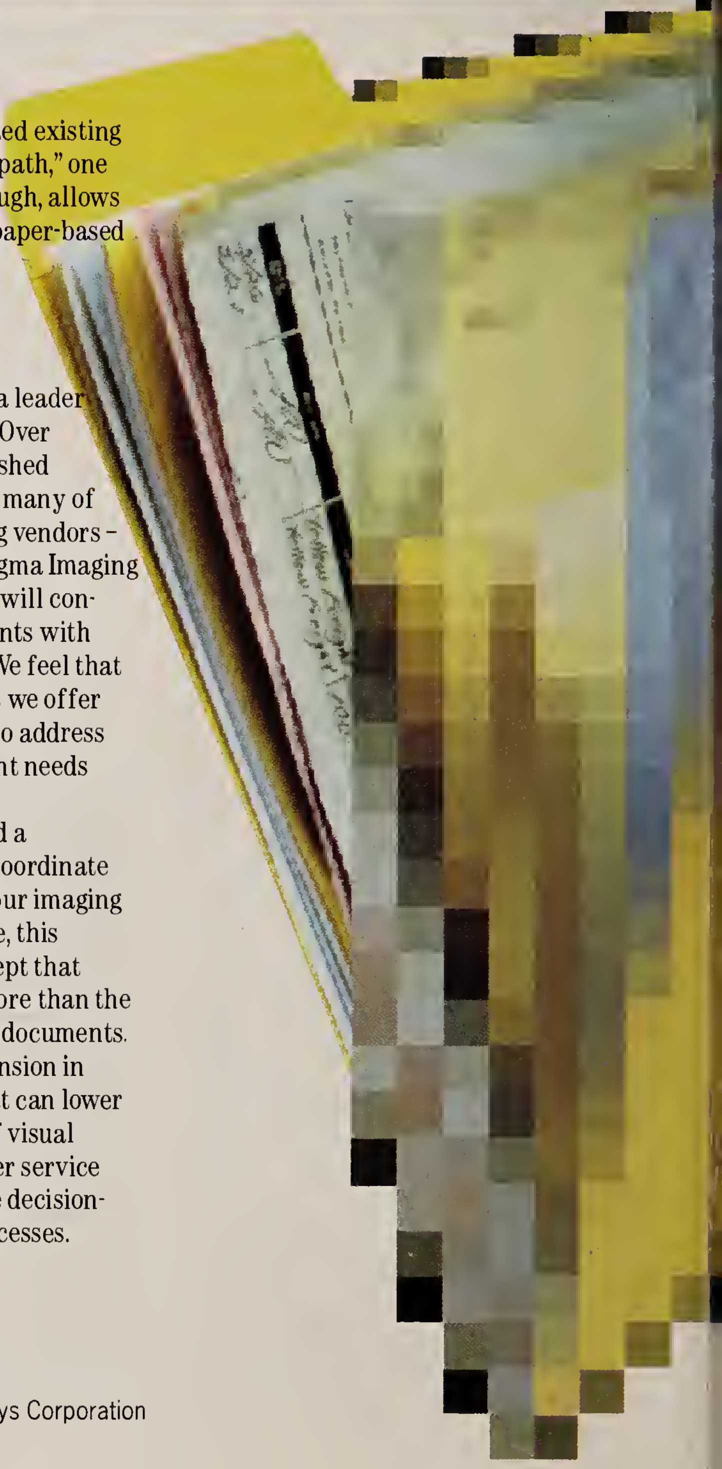
Imaging Relieves the Paper-Processing Bottleneck

Imaging technology has reached the point where we can cost-effectively relieve that paper-processing bottleneck and automate those areas of the workplace that heretofore couldn't be automated. In spite of the proliferation of computers in recent years, only about 1% of all corporate information is managed with computers. Nearly all the rest is on paper. So we really haven't eliminated a lot of paper; in many cases, we've only created more. While computerization has certainly streamlined many business processes, it has for the most part simply automated existing operations – "paving the cow path," one wit has called it. Imaging, though, allows us to go beyond that and put paper-based business information online.

Unisys: A Leader in the New World of Imaging

Unisys is committed to being a leader in this new world of imaging. Over the past year, we have established cooperative agreements with many of the industry's leading imaging vendors – companies such as FileNet, Sigma Imaging Systems and Access – and we will continue to pursue such agreements with other innovative companies. We feel that this adds value to the systems we offer our customers and allows us to address their information management needs completely.

In mid-1989, we established a Corporate Imaging Office to coordinate the various activities within our imaging program. Known as InfoImage, this program is based on the concept that electronic imaging is much more than the ability to serve up pictures of documents. Rather, it's a whole new dimension in information management that can lower costs, speed up the delivery of visual information, improve customer service and, most important, enhance decision-making and management processes.



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The InfoImage Suite of Solutions

In the fall of 1989, Unisys became the first major vendor with a full-scale imaging solution on the general market with the announcement of two imaging products: InfoImage IIPS (Image Item Processing System), which addresses the banking industry's need to handle a growing volume of paper checks; and InfoImage EDMS (Engineering Document Management System), which is designed to help manage the drawings and other visual information used by manufacturers, utilities and large facilities. More recently, we announced InfoImage Folder, a system that enables companies to manage related documents in electronic "file folders," routing them to the appropriate people for action and tracking work progress.

In the coming months, our InfoImage suite of solutions will expand with the release of new products.

A Modular Approach to Grow With Evolving Technology

In developing our InfoImage products, we've chosen to rely on nonproprietary, open systems and to build our products around industry standards as much as possible. What's more, we've taken a modular, building-block approach with our imaging systems. This ensures that these systems can grow easily as a company's imaging needs grow, and that a business won't be locked out of future technological developments – an improvement in optical storage, for instance, could be easily incorporated without having to scrap an entire system. We recognize that imaging is an evolving technology, and we believe that this modular approach, along with our commitment to open systems, means that our imaging customers will have the flexibility to keep up with change, whether it's in information systems or the business environment.

Integrated Image-Enabled Information Systems

Underlying our InfoImage program is the philosophy that imaging should not be viewed and treated as an isolated, separate technology. It is really a tool to manage information, and to be most effective in an organization, it must interact with the other tools that manage information. That means integrating imaging into the overall information system.

In short, we feel that it is important to offer image-enabled information management solutions. Our technical expertise, combined with our long history of working closely with customers in government, manufacturing, banking and virtually every other industry, puts us in a good position to provide integrated systems tailored to a company's specific needs.

The Unlimited Potential of Imaging

We believe that the imaging marketplace will rapidly evolve over the next five years – and Unisys expects to be an integral part of it. As imaging is incorporated into traditional information systems – and indeed becomes a fundamental part of data processing – we'll see a whole new element added to the management of information.

Companies, of course, will be able to store and retrieve information more efficiently than ever before. But while the immediate benefits of imaging – the cutting of costs and the improvement of customer service – are already well documented, the long-range benefits and usefulness will undoubtedly go far beyond that. Once you get an appreciation of this technology, every time you turn around you'll see another use for it. And the fact is, nobody really knows what the real potential of imaging is, in terms of new products, new services, even new kinds of businesses. As one report recently pointed out, "the book on imaging has not yet been written." With InfoImage, we'll be working with customers to do just that, and explore the vast potential of imaging as we move into the 1990s.

UNISYS

We make it happen

while decreasing data entry errors by 25%. It also gained the less tangible benefits of improving supplier relationships and reducing finance charges.

TYPES OF IMAGE SYSTEMS

There are four generic image management system types. Each is based on document size and other factors relevant to the information. The size is important because it impacts the type of input and output peripherals, workstation needs and many basic architectural considerations.

General Business Systems

These systems vary depending on whether they are oriented toward transaction processing or a central repository function. In a transaction processing environment, image management systems improve the economics of managing the active life cycle of the document. In a central repository, the goal is to store vast quantities of images over a prolonged period of time.

Item Processing Systems

Item processing is a unique form of image management due to the small size of the documents and the very high scanner throughput required when processing them. For example, many banks process hundreds of thousands of checks daily within short periods of time, and the entire U.S. banking industry will process approximately 50 billion checks in 1990 at an average cost of five cents per check. Image management systems can increase processing throughput by 20 to 30% over previous systems. When this increased throughput is coupled with the decreased processing costs offered by image management systems, banks plainly benefit.

Engineering Drawing Systems

Engineering drawings may depict complex, two-dimensional product specifications or design plans for a simple bolt. Some of these drawings are up to 100 feet long or longer. They require special-width scanners and plotters in conjunction with specialized drawing software. Although many engineering companies employ CAD/CAM systems to create and manipulate drawings, those systems are not able to convert the massive base of paper drawings that currently exist. Image management systems can act as a bridge between these two environments by electronically converting the paper drawings and storing them in digital databases.

Mapping Systems

Mapping systems are typically used to manage land use by government agencies. They can be used to assess tax bases by depicting the amount of available land, the number of buildings on the land and the number of new buildings the open land will allow. Mapping systems can also depict gas mains and underground wiring that may be impacted by construction. They need color and graphic capabilities as well as compatibility with dissimilar systems at other government agencies. The Italian government, which rents many buildings and offices to its citizens, is currently using mapping image management systems to measure the floor space in these buildings in order to assess taxes on their use.

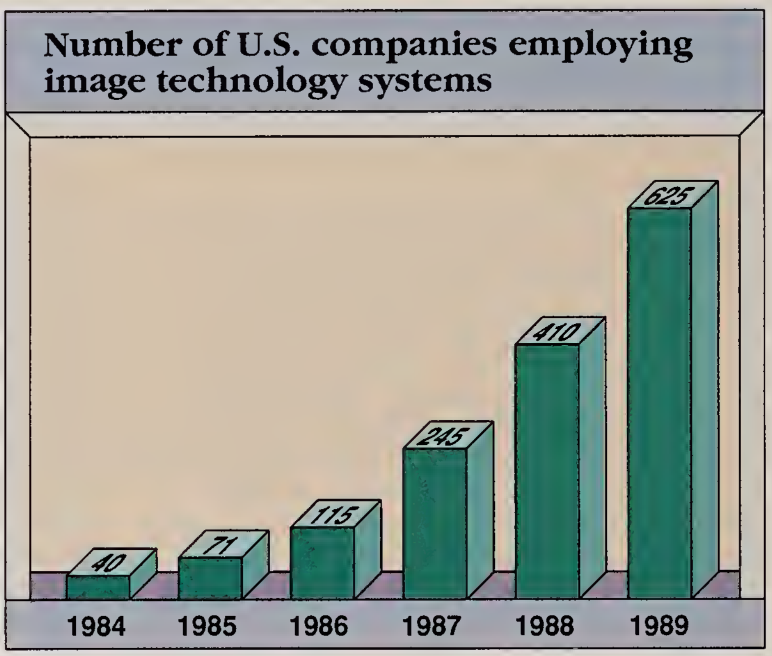

Number of U.S. companies employing image technology systems

Image management systems have enjoyed rapid growth in the U.S.

COMPLEMENTARY TECHNOLOGIES

Image management systems must coexist with other technologies such as optical character recognition (OCR), microform and electronic data interchange (EDI).

Optical Character Recognition

OCR is an alternative to manually indexing a document as required with image management systems. OCR views the dark and light areas around a specific letter and interprets, for example, a T from a P. It is important for users to realize that the OCR function takes processing time and specific software. The decision to manually index documents or use OCR depends on the application under consideration. OCR is most useful on structured documents such as business forms.

Microform

The two components of microform, microfilm and microfiche, are the most cost-effective methods for storing inactive documents on a long-term basis. However, they are not appropriate for companies that can't tolerate a long out-of-file time, or for situations where documents may need to be accessed for active processing or reference.

Electronic Data Interchange

Electronic data interchange (EDI) is primarily used to transmit and receive business documents, such as orders and bills, between manufacturers and suppliers, according to predefined electronic formats. EDI works well in established customer-supplier relationships in which both parties have approximately the same level of automation. The problem with EDI is, the great majority of business communication involves users who either can't utilize EDI because of the incompatible software and standards, or simply need more capabilities than EDI can provide. In these situations, imaging is appropriate.

VALUE, FUNCTIONS AND BENEFITS OF IMAGING

Why are Image Systems Strategic?

Image management systems are strategic because they give users a competitive edge. They effectively allow companies to implement improvements in management controls, reduce transaction costs and differentiate themselves from the competition—the most compelling reason of all for investing human and financial resources.

High-Value Applications

IDC refers to applications in which image management systems can provide a high return on investment as high-value applications.

Banks are obvious prospective users. High-value banking applications are check processing, mortgage loan processing, mortgage loan servicing, credit-card application processing, consumer loans, IRAs/Keoghs, international trade finance, international funds transfer, trust and stock ownership transfers. Of all these, IDC believes check processing, an industry in its own right, holds the most promise.

The high-value applications for image management systems in insurance are underwriting, claims processing and investment management. In the pharmaceutical industry, image management systems show a high rate of return in case report form applications, regulatory affairs and medical libraries. Many high-value applications occur at the departmental level.

The American Express Paradigm

In its push to become the preeminent vendor of credit card services, American Express has been in the vanguard of image management system implementation. Now entering the fourth phase of its image management project, the company has leveraged its two-year lead in image implementation to enhance its statement printing operation and in so doing, differentiate its products from the competition's. The company's new monthly billing statement that depicts an image of each individual transaction is a good example. It has reduced its billing costs 25% and is working to reduce the amount of keying and, therefore, the number of data entry errors. The net effect of all this will be twofold: American Express will have the lowest costs and offer the most services.

Key Functions and Benefits

One key to successful image management system implementation is understanding its functions and benefits, for there are many of both. When functions and benefits are fully realized, users will save money, increase productivity and more efficiently utilize personnel. The first step in understanding functions and benefits is understanding how documents flow in and out of companies.

Organizations are required to process two general types of information—external and internal. It is very difficult to control the form of incoming external information. Examples of external information include credit-card applications, mortgage loan applications, insurance applications, checks, requests for new drivers licenses or replacement birth certificates.

Internal information includes such items as sales reports, memos and production information. Controlling how it is created, disseminated and finally stored is easier than controlling external information. This control is being enhanced by the advent of increasingly standardized systems and more effective methods of document exchange.

Because there are so many nuances in implementing image management systems, the benefits and system design issues vary tremendously, depending on the particular application. Notwithstanding these industry and application differences, image management systems represent the best way to process external information. Building on that attribute, image management systems offer the following functions and benefits:

Digitizing Documents at the Earliest Possible Point

Mail rooms are the main points of entry for external information, and as such, likely candidates for image management systems. Managing the mail room has become an enormous challenge for large companies. In fact, many companies hire outside services to manage their mail operations, in the same way some data centers are managed. The reasons are simple: While the cost of the mail room was once assigned to general company overhead, more and more companies are trying to charge back departments for these services. Also, companies are trying to realize economies of scale.

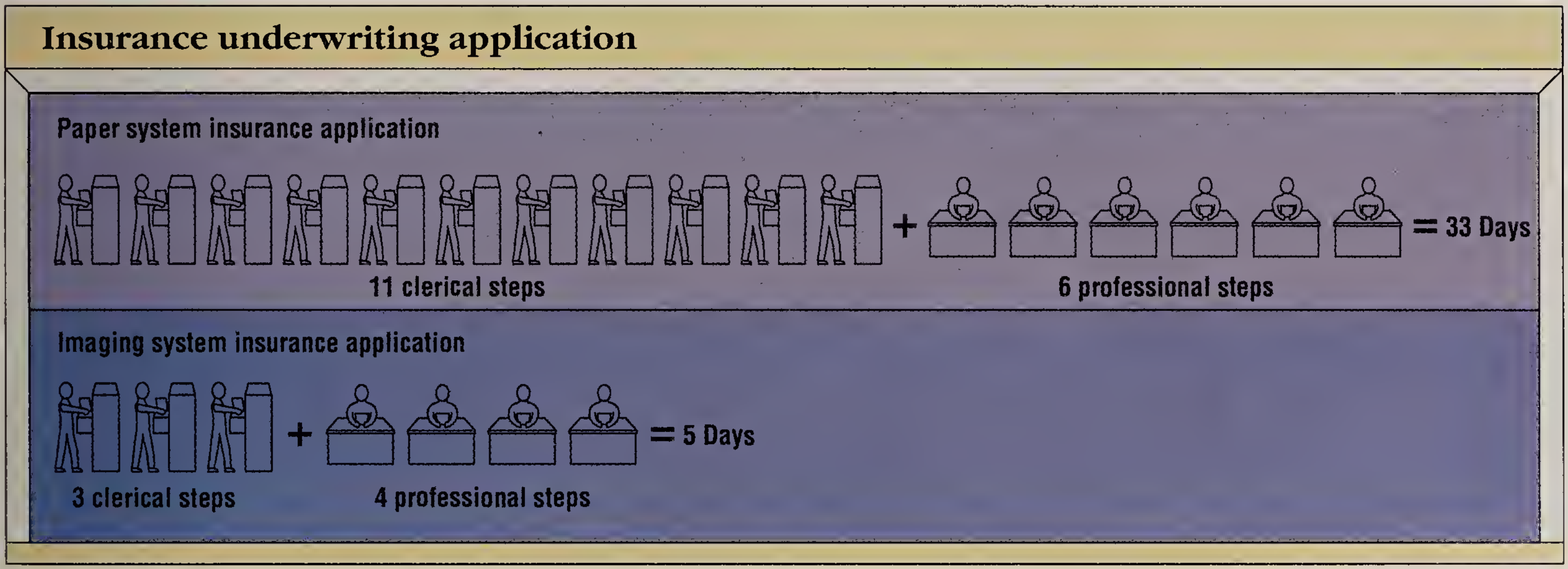
Image management systems can reduce the sorting process and provide cost reporting and charging. Users benefit by capturing information at the first point of entry into the organization.

Example: One large health insurance organization processes more than 80,000 claims per day. When processed through a sorting procedure in the mail room, almost 1% of them were lost or misplaced in the initial sort. The second sort, by claim type, had a misplacement rate of 3%. A third sort, by processing category, had a 4% misplacement rate. The costs of tracking and rerouting documents plus managing the process and generating reports was costing this company in excess of $4 million per year. As a result, the organization is now evaluating image management systems.

Electronic Routing

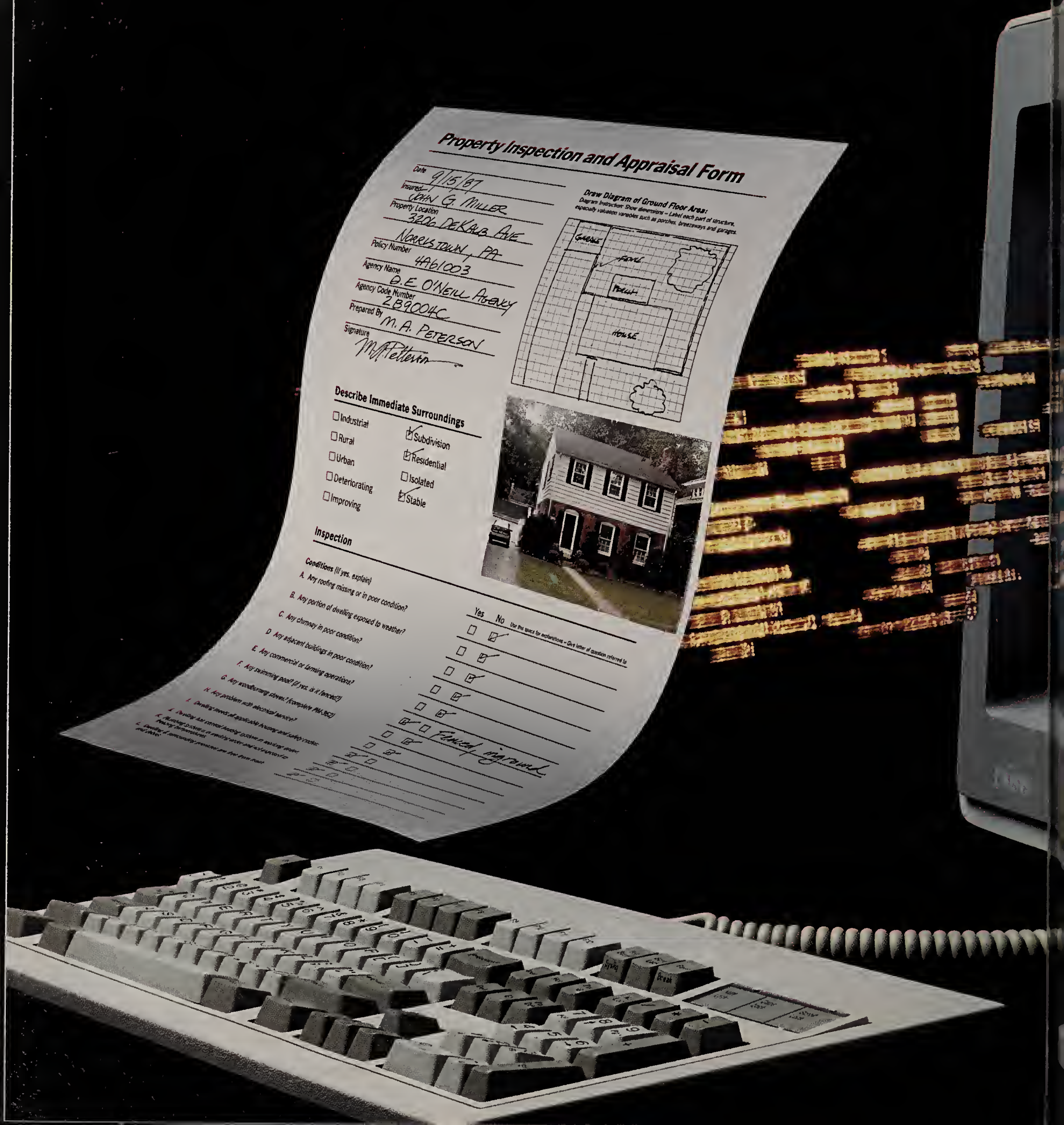
Electronic routing offers a level of structure and flexibility that a paper-based environment simply cannot attain. Two of the main benefits of electronic routing are multiple access and automatic rerouting. Paper-based business systems generally are serial—there is only one copy of the original document and only one person can access it at a time. In contrast, image management systems provide simultaneous access to the same document, allowing many elements of the business process to occur in parallel. In many cases, the total number of steps in the process can be reduced significantly while the time to process is shortened dramatically.

If an operator in a document processing operation is out sick or on vacation, the image management system can be configured, by either manual intervention or system defaults, to send the operator's workload to a back-up person. The system can


Insurance underwriting application
Paper system insurance application
+
= 33 Days
11 clerical steps
6 professional steps
Imaging system insurance application
+
= 5 Days
3 clerical steps
4 professional steps

The improved efficiency and reduced work flow justify the expense of an image management system.

Unisys InfoImage Solutions. Take



Property Inspection and Appraisal Form

Date 9/15/87

Insured JOHN G. MILLER

Property Location 3206 DEKALB AVE
NORRISTOWN, PA

Policy Number 4A61003

Agency Name D.E. O'NEILL AGENCY

Agency Code Number 2B9004C

Prepared By M. A. PETERSON

Signature M.A. Peterson

Draw Diagram of Ground Floor Area:
Diagram Instruction: Show dimensions – Label each part of structure, especially valuation variables such as porches, breezeways and garages.

Describe Immediate Surroundings

☐ Industrial
☐ Rural
☐ Urban
☐ Deteriorating
☐ Improving
☑ Subdivision
☑ Residential
☐ Isolated
☑ Stable

Inspection

Conditions (If yes, explain)

	Yes	No	Use this space for explanations – Give letter of question referred to
A. Any roofing missing or in poor condition?	☐	☑	
B. Any portion of dwelling exposed to weather?	☐	☑	
C. Any chimney in poor condition?	☐	☑	
D. Any adjacent buildings in poor condition?	☐	☑	
E. Any commercial or farming operations?	☐	☑	
F. Any swimming pool? (If yes, is it fenced?)	☑	☐	Fenced, inground.
G. Any woodburning stoves? (Complete PM-36Z)	☐	☑	
H. Any problem with electrical service?	☐	☑	

the paper out of paperwork.

Checks, blueprints, photos, claims, signed authorizations, maps – images that are vital to business and government.

And up until now, it's paper that's choking the information process. All because, unlike numbers and letters, images couldn't be manipulated electronically.

Quick access to documents, sharing them, moving them around and doing it cost effectively is what the Unisys InfoImage suite of imaging solutions is about. They're practical, modular solutions that fit easily into your existing information system, no matter whose name is on it.

Practical – because Unisys recognizes that not all documents are the same:

Customer Files. Those documents with signatures, handwritten annotations or photographs that couldn't be stored or sent electronically in the past are now efficiently handled with InfoImage Folder. With online access, you can respond fast to customers, process applications, handle claims.

Checks. Unisys InfoImage IIPS dramatically changes the way financial institutions handle paper and process checks. It reduces the heavy backroom staff burden and increases payment processing speed.

Engineering Drawings. InfoImage EDMS captures all of those oversized drawings and allows any organization quick access to a complete and accurate set. From engineering to purchasing to the shop floor.

InfoImage solutions from Unisys. They take the paper out of your paperwork. For more information and a demonstration diskette, call 1-800-448-1424, ext. 39.

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UNISYS

We make it happen

also be configured to take advantage of each operator's unique talents.

Example: A bank that processes mortgage loans routes them to operators based on the mortgage's value and whether it is residential or commercial. The system then automatically makes sure no operator has more than five mortgages in his or her work queue at a time.

Digitization

The advent of digital technology opened the door for image management systems, and gave them the opportunity to realize their true problem solving potential. One problem they have scaled back is out-of-file conditions.

Misplaced or out-of-file conditions have been a continual problem for businesses, particularly in their efforts to improve customer service operations. Digitizing and suitably indexing images ensures that files can never be misplaced and out-of-file conditions will never exist.

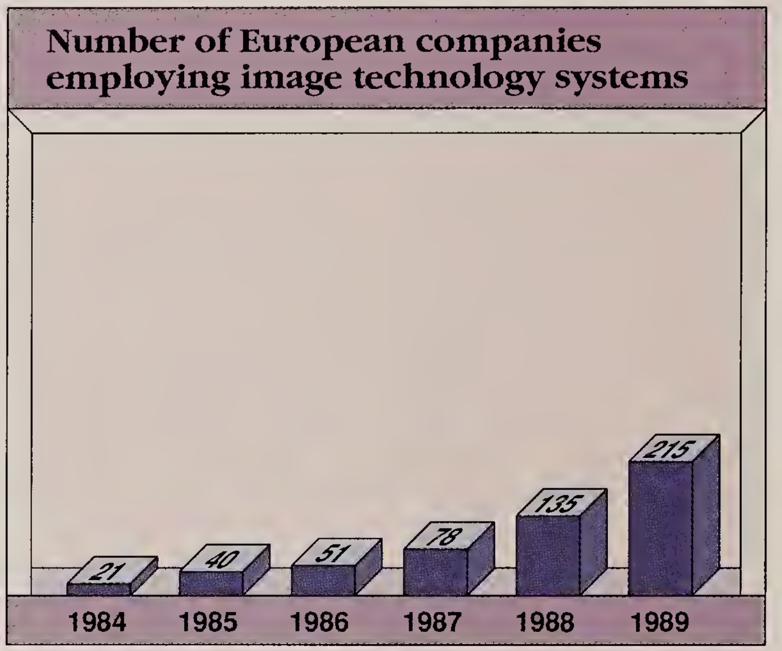
Example: The third largest private health insurance company in the United Kingdom recently announced its intention to service its 500,000 policy holders with an image management system. This company processes 4,000 claims per day. Locating a file within the paper-based system can be extremely unpredictable, since on average 5% of all client files will be in an out-of-file position at any time. The filing department is required to move 25,000 files per week, and at any time, 20,000 files will be out of the system.

Files that become misplaced on a permanent basis obviously pose an even larger cause for concern. In fact, a U.S. insurance company that lost the files of one particular client faces a $60 million lawsuit because the insurance company disputes the client's coverage claims.

Reducing Data Entry Errors

Data entry is a notoriously mundane and poorly paid job with high turnover. Because of these factors, many errors creep into the process. However, this negative trend can be reversed.

Example: A local government agency implemented an image management system using sophisticated software that made the screen image of the document identical to the form data was being entered from. As a result, data entry errors were reduced 25%.



Although increasing, European implementation lags behind the U.S. pace.

Numerous studies aimed at determining how to increase productivity and decrease errors have been undertaken. They have found the only two ways to improve data entry are increasing the amount of control the operator has over his or her environment, and ensuring the clarity of the input material. Image management systems reduce operator fatigue because they produce consistently clear images and can be configured for frequent operator breaks.

Research shows that operators work most efficiently when they have only one image on the screen at a time. In order to make sure they move as quickly as possible from one screen to the next, users may program these systems so any one of their final keystrokes on one screen will prompt the next one. Unisys has extensive empirical evidence showing that an ideally configured image system can lead to a 100% increase in productivity across the entire population of data entry clerks in a check processing environment.

As OCR technology improves rapidly, the amount of keying will be reduced substantially. Intelligent document design is a critical element in this process. Potential users should start planning their document design now.

Facilitating Business System Redesign

Image management systems allow improvements in business systems beyond parallel processing and cleaner data entry. As management controls improve, the number of tasks in a process can be reduced.

Example: Using an image system and workflow automation—which expedites the movement of paper images from one processing point to another—an insurance company reduced the number of handling stages for an insurance claim from nine to three. Eliminating steps in the process is a crucial element of image management systems.

Reducing Physical Storage Space

Storage space is valuable and expensive. It is not unknown for companies to move entire operations to new buildings because of storage costs and availability. Many insurance companies in the U.S. are using 25% of their total office space for file storage.

Example: By implementing an image management system, a pharmaceutical company that generates 10 million records a year reduced its required storage space and avoided moving to a new building.

Reducing Document Retrieval Time

Increasingly, companies are competing to see who can give the best service. The faster claims or applications are processed, and customer inquiries are answered, the more likely a company is to beat the competition.

Image management systems excel at retrieving complete customer records quickly, allowing operators to answer questions in a minute or less. This results in dramatically fewer return calls to customers, and in some cases, lower requirements for customer representatives. It also results in happier customers.

Several companies that employed image management systems to recall records were initially afraid customers would balk at the time they waited on the telephone while their image-based records were retrieved. Since most records include images and data, the solution called for retraining sales operators in telephone techniques and requesting image files upon first customer contact. This provided baseline information and kept the customer service process going until the complete set of images could be retrieved and displayed.

Example: The cost of returning customer service calls is staggering in many companies. A major New York bank discovered it could save enough money purely on telephone costs to yield a three-year payback on a multi-million dollar image system.

Improving Document and System Security

Paper-based systems offer limited security. The vast majority of image management systems have excellent security capabilities, including the ability to restrict access down to the individual document.

Example: A nuclear power plant wanted to minimize the number of engineering drawings that its employees could access. To do so, it implemented an image management system with a restricted amount of workstation memory and no local printing. The reduced memory reduced the number of drawings that could be accessed, and the absence of local printing made sure the drawings would remain in the system.

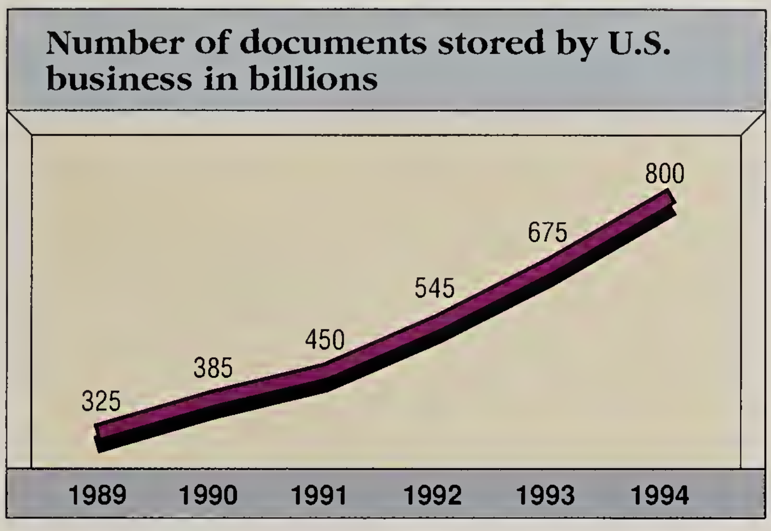

Number of documents stored by U.S. business in billions

Image management systems can manage this avalanche of paper.

Improving Management and Government Report Capabilities

Image systems generate customized reports that make it easier for companies to track internal information. This reporting function is critical to organizations that are subject to government regulation.

Example: A midwestern bank was accused several times in the past five years of discrimination in its mortgage lending practices. Although the bank was able to prove that this was not the case in all but one charge, the cost of refuting the claims, including collecting the necessary documentation, were damaging. The bank subsequently employed an image management system to increase customer service and address legal questions cost efficiently.

Providing a Productivity Measuring Tool

Image management systems provide a very good basic tool for looking at individual productivity. This tool can sometimes be perceived as threatening. However, if used wisely, it can identify where bottlenecks occur and help effect a remedy. Example: A U.S. hospital rewards bonuses to clerical workers based on the number of accounts receivable they settle.

Eliminating "Knowledge-Based Downtime"

Frequently, by the time someone receives a paper-based document, that individual has forgotten why he or she requested it in the first place. As a result, users spend a significant amount of time reevaluating documents. IDC calls this "knowledge-based downtime." In many cases, it decreases personal productivity by up to 15%. In addition, it is not unusual for knowledge workers to spend a total of 20% of their work day just trying to locate documentation.

Example: Based on information from available documents, state government tax auditors audited certain individuals and organizations. However, all documents needed to perform the complete audits weren't available. By the time they were—usually two-to-three days—the auditors were forced to access their original documents to remember why they wanted to do the audits in the first place.

THE SYSTEMS VENDORS

In 1987, Wang was the first systems vendor to enter the image management systems market. IBM followed suit a year later, in 1988. Although it was late to market compared to Wang, IBM still made somewhat of a hasty entrance by its normal standards. When it felt user demand and saw the market was heating up, Big Blue bypassed its normal meticulous preparations and jumped in.

Having entered the market in 1989, Unisys has developed an open and standardized environment. It has integrated and is installing outside technology into user-specific applications.

Unisys uses FileNet's back-end capabilities for file clustering, and its look-ahead software for retrieval. It has also licensed Sigma Imaging Systems' workstation software, which runs on a range of workstations.

Most of the other systems vendors such as Digital Equipment Corp., Hewlett Packard Co. and NCR Corp. have recently announced products. They are also developing alliances and third party relationships to service the industry- and application-specific demand for image management systems.

DEC has built image functionality into the lowest levels of its system architecture for almost six years, e.g. extensions to VMS. HP and NCR elected to play catch-up by acquiring software technology from Plexus Software, Inc. The two biggest technical challenges to all these vendors are seamlessly incorporating image technology into their existing office system architectures and developing workflow and procedural automation software. IDC believes most of them are ignoring software development in their quests for seamless integration.

THE ROLE OF THIRD PARTIES

Third party vendors can play several roles in the image management system market. First, they can customize a base system for a particular application. Second, they can concentrate on a particular part of the system technology such as OCR. Third, as in the case of Unisys, they can actually provide the components of the system platform. Because of their narrow focus in either capacity, they can be an important source of technology development.

Having realized the value of vertical market-oriented third parties, Wang signed up more than 100 third parties, while DEC, which maintains traditionally strong third party relationships, has more than 40. IBM, which in recent years abandoned its policy of strictly internal product development, has selected 30 third parties.

This diverse market requires systems vendors who intend to work with third parties to understand the needs of a wide range of users who want their systems developed by familiar vendors. This puts pressure on the vendors to offer a development environment that lends itself to customizing products across a broad range of applications.

A USER'S GUIDE TO THE MOST COMMON MISTAKES

There are plenty of potential pitfalls when implementing an image management system. Here are some dos and don'ts:

Do write a thorough, well-researched RFP. The vendor community has drawers full of RFPs it cannot respond to because they were so poorly written.

This is because many prospective users are not properly evaluating their needs in terms of functions and features. There is also danger in letting a vendor help you write an RFP. Since many system features are proprietary, a vendor could slant the RFP to the point where its competitors would not even bother to bid. That may result in a noncompetitive environment that costs the user a 15-20% premium. The solution is to get help. This can come in the form of an outside consultant or an internal task force.

Do change your business system. Image management systems are not meant to operate in a void. If you are going to get the most out of them, it is necessary to make adjustments. This can result in modifying business practices, which in turn may result in hiring or reassigning personnel. The point here is that a user will maximize the value of its investment by looking at its system overall, rather than simply automating discrete steps that exist today.

Don't wait for standards. There are sufficient standards to ensure that an adequate migration path can be put in place. By waiting for standards many companies could dilute a competitive advantage. In fact, many large banks and aerospace companies waited until they were at a competitive disadvantage before implementing systems. The message: Waiting is not free.

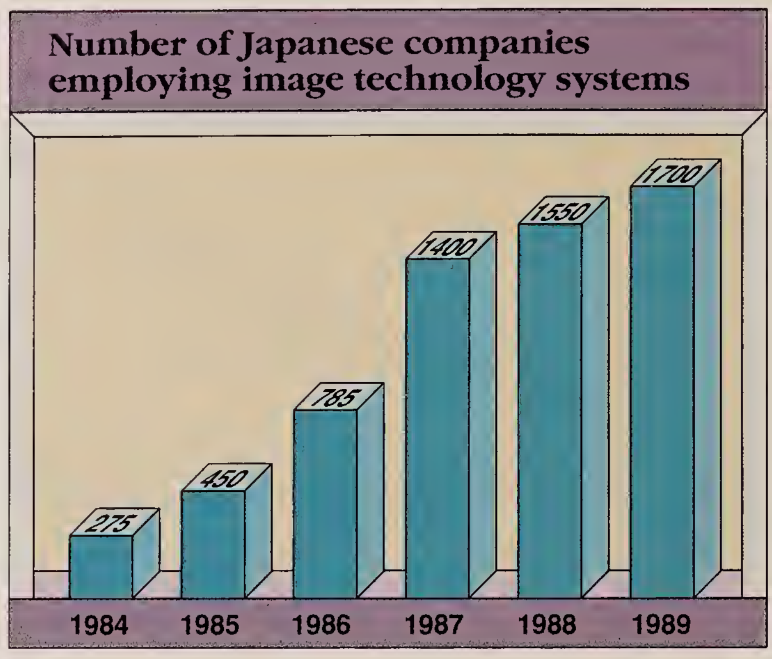
Don't put in a pilot system. Many users have put in small pilot systems for test or demonstration purposes. Since the technology is already proven in thousands of commercial installations, this is a waste of money. It can also be misleading. A pilot system with four or five workstations will not elicit the same architectural issues, or deliver as much performance as a larger system. As a result, user expectations can be skewed. This is not to say that the use of departmental technology and limiting the scope of the first application is not a valid strategy. IDC encourages users to build systems based on a modular approach.

TRENDS AND ISSUES

Standards

Since no user wants its image management system to exist as an island of automation, most vendors have invested substantial resources to ensure their products are compatible with the IS world. As a result, the majority of image systems are able to emulate common terminals such as IBM 3278s and DEC VT-100s. Many also offer coexistence at the network level and run on popular database management systems from such firms as Oracle and Informix.

Many image management systems have made concessions to the data world by supporting SNA and TCP/IP Ethernet connectivity. Most also use standard CCITT Group 3 and Group 4 compression algorithms. Despite this, many systems will not communicate with popular operating systems without extensions and the addition of proprietary board-level technology. Many also use proprietary hierarchical indexing techniques for the image index.



While the U.S. leads Europe in implementation, Japan has about one-third more companies using systems. However, the dollar value of U.S. shipments is higher because more Japanese systems are based on less expensive personal computers rather than the larger processors more common in the U.S.

The standards that are available for such things as cartridge size and disk sector usage are receiving broad support. In addition, image management system vendors are pushing for standards that will provide compatibility across their competing products. New image transmission protocols are also needed, as existing data transmission protocols are insufficient for the larger image blocks that may be 50K bytes, 100K bytes, and larger.

There is a delicate balance to maintain here. Because the technology is still evolving rapidly, standards run the risk of being ignored in the quest for increased performance and functionality. This leaves a wide open market for innovative companies that want to make their product the de fa standard.

Future Technological Developments

As image management technology matur it will continue to place developme demands on computer technology. Just as large blocks of data composing a single ima have pushed the limits of current syster networks will have to be upgraded accommodate heavy image traffic in future. In an effort to keep pace, vend have extended the capabilities of th database management systems and writ extensions to SQL. Proprietary methods h also been employed to speed the process of storing images optical disk and reducing the nu ber of seeks required to retri documents.

The most important desi advancements will come in s ware. IDC expects to s enhanced intelligent charac recognition and more flexil user interfaces. More advanc workflow software will all users to designate processi paths without using a lower le language. Image manageme applications will also increasi ly migrate away from propriet processors to more univer host environments.

Component advancements be marked by the movement compression and decompressi capabilities to the chip level controller boards, where pre ously they were found on ima processor boards. The stora densities of both magnetic and opti disks will continue to at least double alm every three years for the foreseeable futu There will also be advancement in subs tem interfaces and monitor technology.

Image management system technolo has already shaped the way many com nies undertake many of their fundamen business activities, and it is clear that i affecting the development of general off system products. Image system technolo will become so integrated with on-l transaction processing and office syst environments, that by the mid '90s it will impossible to separate the three areas. that time, image management system us will have a seamless, standardized envir ment and the luxury of picking the products from a competitive market.

But they shouldn't wait. The competi advantages of image management systems available today to those who decide to act.

PCs & WORKSTATIONS

COMMENTARY

Richard Pastore

IBM image losing luster

Rumor has it that this fall is going to be a prolific one for IBM's Personal Computer division. It had better be.

Observers have been suggesting for years that IBM Personal Computers do not offer the best value, are not the most innovative, are not tops in quality or performance and do not constitute the broadest product line. But the number of critics seems to be growing as the competition from low- and high-priced clones heats up.

You'd expect users to dump on IBM's prices. But more ominously, during the past year an increasing number of users have complained about poor quality, subpar performance and a lack of models suitable for their particular needs.

It seems the only thing IBM PCs have to recommend them is the comfort factor afforded by the three venerable and rock-solid initials on the box. IBM would not be wise to rest on this single laurel, however. Compaq, Apple and Tandy have been producing PCs for three decades among them; these firms are becoming fairly comfortable to a lot of users.

IBM is by far the market-

Continued on page 60

A dilemma made for multimedia

New office furniture design demanded innovative application

ON SITE

BY MICHAEL FITZGERALD
CW STAFF

In 1988, when Steelcase, Inc. was readying its Context product line, a radically different concept in office furniture, it wanted to make sure the product did not flop because it was too different for the traditionally staid office furniture market. Its solution was not mundane: Steelcase developed an on-line multimedia application that actually lets designers create office space on a computer screen, right down to fabric selection.

Despite its innovative styling, Context created two major problems for Steelcase.

"We had to raise the understanding of the design community as quickly as we could, and we had to find a way to basically retrain them and change the way they thought about furniture, so they could appreciate the designs they could do with this furniture," said Mark Greiner, director of information strategies at Steelcase.

At the time, multimedia was something Steelcase was just dabbling in, Greiner said. But Apple got wind of this and approached Steelcase to have it become a showcase corporation for multimedia. The two companies began discussions, and Apple produced a prototype — really just an on-line catalog — that sparked ideas at Steelcase, which brought 15 people together for a three-day meeting in the hills outside of Santa Fe, N.M.

From this meeting stemmed the decision to promote and support Context through the use of multimedia tools, and ultimately, a decision by Steelcase to support every major product unveiling with the use of multimedia. The strategy consisted of two parts: an on-line information system, which is finished, and a planning system, which is approximately 60% done.

The information system contains all the

Continued on page 62

Peter Yates

Greiner changed *attitudes about furniture*

Upgrade plan buoys Interleaf outlook

BY MAURA J. HARRINGTON
CW STAFF

CAMBRIDGE, Mass. — Interleaf, Inc. is expected to announce a major upgrade to its flagship product next week in a move that some analysts claim could help put the company back on its feet after more than nine months of struggling to survive a major, but necessary, reorganization. Last November, the company exited the hardware industry and cut 18% of its staff to survive the onslaught of decreasing software prices.

Interleaf's Technology Publishing Software (TPS) system Version 5.0, scheduled for announcement Oct. 4, is considered a major upgrade to Version 4.0 and is expected to include a new feature called active documentation. This feature allows the system to identify the user and help interpret spreadsheets and graphics that have been preidentified as important to the user.

"The active document technology is a major step forward for this technology. I don't think there is anyone else with anything quite like it," said David Nelson, an analyst at Shearson Lehman Brothers in New York.

Details on the active document feature announcement were drawn from analysts and confirmed by Interleaf.

With the active document feature, the system could, for example, identify that user by his log-in, open a document, pull important figures from any other document and automatically display them to that user when he logs in, or it could bring up a document for viewing in several different formats, according to Alex Henderson, an analyst at Prudential Bache Securities in New York.

"This product could revolutionize the way tables are made," said Andrew Poole, a Version 5.0 alpha-test user and a software engineer at Texas Instruments, Inc.'s Documentations Systems Group in the company's Design Automation Division in Dallas.

"With Version 5.0 of Interleaf's TPS product, users are able to gain access to routines that weren't previously available," he said.

With the active document feature, Poole said TI would be able to write most of a user manual before products are finished and then automatically insert additional information later.

The active document feature can also limit access to authorized users and automatically update any graphs attached to the document, Poole said.

The COBOL Programmer Workstation and Its Impact on Productivity
The Micro Focus Developers Seminar Schedule

Oct 2nd	Detroit, MI
Oct 16th	Atlanta, GA
Oct 25th	Honolulu, HI
Nov 8th	Vancouver, Canada
Nov 15th	Washington, DC
Nov 15th	Birmingham, AL
Nov 20th	Omaha, NE
Nov 29th	Seattle, WA

The Programmer Workstation environment uses personal computers as intelligent, distributed workstations for developing, testing and maintaining host-based COBOL applications. At these Developers Seminars you will:

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- ✔ See an in depth technical demonstration of the Micro Focus COBOL/2 Workbench facilities.
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The most important one being, it's from NEC.

Which means that not only does the PowerMate SX/20 give you advanced technology, excellent performance and uncompromised quality, it also offers you the security that your system will be fully supported in the years ahead by people who will be there when you need them.

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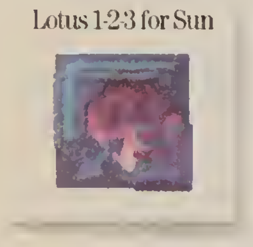


PRODUCT REVIEWS

Dbase upgrade worth the wait

After more than a year of shipment delays, Ashton-Tate Corp.'s Dbase IV, Version 1.1 has finally arrived. A number of features have been added to enhance its memory management and performance, and as a result, its overall operation shows a marked improvement in speed.

Dbase IV requires a minimum of 450K bytes of memory. A dynamic memory manager handles overlays better and releases more memory for application space. An optional integrated disk cache uses extended or expanded memory to cache data and overlays. More system parameters have been added to let users tune system performance.

Dbase IV Version 1.1

Price: $1,295

- Performance: Poor to very good
- Documentation: Very good
- Ease of learning: Very good
- Ease of use: Good
- Error handling: Good
- Support: Satisfactory to very good
- Value: Good

Other improvements include conditional indexes, new language commands and removal of the limitations on user-defined functions and On commands.

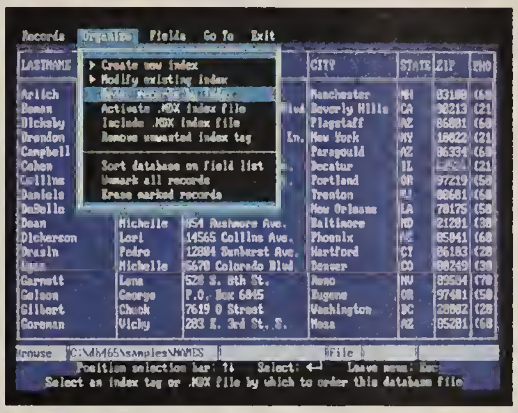
For multiuser systems, a new command lets users check how long a record has been locked and who created the lock. The browse and edit screens now have access to the Organize menu, which allows users to build and select indexes as they work. The query by example (QBE) module has been improved, and printer support has been expanded. When using SQL, users can browse data tables and run reports or queries.

Dbase IV still lacks nonprogrammed multifile data entry. Users cannot enter data into more than one file at a time without writing custom programs.

Data-entry control is extensive, with a large collection of formatting templates and functions. Edit options let users specify a prompt, error message, range and validation for each field. Calculated fields can be defined, but the formula cannot reference another calculated field — a severe limitation.

The screen painter has most of the common features for boxes, lines and color control required to create attractive data entry forms. Unfortunately, screen manipulation can be awkward.

Dbase IV's query facility implements a QBE interface. Up to eight files can be related and queried by pointing to fields in a diagram. A file can be related to itself to perform a self-join. Dbase IV does not include an optimizing query engine. To perform a query, it writes a program. If an index does not exist for a linking field, one will be created. The index is created when the query is saved.



```
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Arlich                                          Manchester     NH    03108 (60
Beman                                      Blvd Beverly Hills  CA    90213 (21
Dicksby                                         Flagstaff      AZ    86001 (60
Drendon                                     Ln. New York       NY    10022 (21
Campbell                                        Paragould      AZ    86334 (60
Cohen                                           Decatur        IL    [illegible] (21
Collins                                         Portland       OR    97219 (50
Daniels                                         Trenton        NJ    08601 (60
DeBello                                         New Orleans    LA    70175 (50
Dean        Michelle  854 Rushmore Ave.         Baltimore      MD    21201 (30
Dickerson   Lori      14565 Collins Ave.        Phoenix        AZ    85041 (60
Drasin      Pedro     12804 Sunburst Ave.       Hartford       CT    06103 (20
[illegible] Michelle  5670 Colorado Blvd        Denver         CO    80249 (30
Garnett     Lena      528 S. 8th St.            Reno           NV    89504 (70
Gelson      George    P.O. Box 6045             Eugene         OR    97401 (50
Gilbert     Chuck     7619 O Street             Washington     DC    20002 (20
Goreman     Vicky     283 E. 3rd St., S.        Mesa           AZ    85201 (60
Browse  C:\db465\samples\NAMES           File
        Position selection bar: ↑↓   Select: ↵   Leave menu: Esc
   Select an index tag or .NDX file by which to order this database file
```

Ashton-Tate's *Dbase IV, Version 1.1*

Dbase IV's report writer and label facilities let users create almost any type of output by painting the design on-screen and making menu choices. Reports can access multiple related files by using views created with the query facility. Calculated fields can be added to reports using any expression.

Dbase IV uses printer drivers and therefore supports several print styles and up to five user-specified fonts.

Dbase IV contains more than 440 commands and functions. A pseudocompiler speeds execution of operations. When an application is complete, it can be distributed with the free runtime module included in the package.

The applications generator allows the nonprogrammer to glue all of the objects produced by the report, query and form designers into a cohesive turnkey system. Although powerful, the applications generator holds many traps. For instance, error checking is minimal.

The flaws that marred Version 1.0's generally good user interface seem to have been mostly removed, resulting in an easy-to-use and productive product.

The documentation included with Dbase IV is of high quality.

Overall, data in the Dbase IV environment is much more secure than it ever was in Dbase III due to such error-handling features as log-in security, file protection and data encryption.

Ashton-Tate offers free support weekdays from 6 a.m. to 4:30 p.m. PST. Ashton-Tate appears to have finally created a stable Dbase IV environment. The Developer's Edition comes with the template-language source code, two extra local-area network keys for multiuser program testing and a royalty-free unlimited runtime license for $1,295. The Standard Edition costs $795, and a LAN version that supports five users costs $995.

Users who need both a highly functional interactive environment and turnkey custom programs may find Dbase IV to be an attractive alternative.

Ashton-Tate Corp., 20101 Hamilton Ave., Torrance, Calif. 90509, (213) 329-8000.

Powering up quick, easy presentations

Powerpoint for Windows, Microsoft Corp.'s presentation graphics software program, focuses on the complete process of creating a presentation. It provides a consistent look to the images, organizes the presentation and produces supplementary materials such as speaker's notes and handouts.

Powerpoint's main menu works like an on-screen slide table. The images are displayed in a 35mm slide format, and they appear in what-you-see-is-what-you-get format throughout.

The program's slide master option serves as the backdrop for all successive slides. The master slide can be adorned with a company logo, presentation title or piece of clip art taken from Powerpoint's extensive library. It can be set up with a preset or custom color palette and a solid or shaded background.

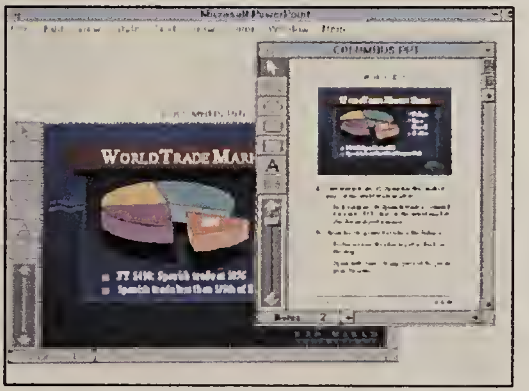
Microsoft Powerpoint for Windows Version 2.0

Price: $495

- Performance: Good to excellent
- Documentation: Very good
- Ease of learning: Very good
- Ease of use: Very good
- Error handling: Very good
- Support: Very good
- Value: Very good

The product comes with numerous presentation templates, including assortments of text charts, graphs and bullet charts.

Powerpoint can automatically produce speaker's notes for each slide. A facility for handouts allows users to print small reproductions of as many as six slides on a page and add text headers or footers.



Microsoft's *Powerpoint for Windows*

The program is solid, but it seems a bit sluggish in its screen operations compared with DOS programs. It provides basic numeric charting capabilities with few frills. Numeric charts are created in a separate program module called Powerpoint Graph. Data for the numeric charts is entered into a built-in spreadsheet. Users can edit a spreadsheet and view its linked chart simultaneously.

Powerpoint has exceptional text charting capabilities. A labeler provides quick entry of small pieces of text. For more extensive input, Powerpoint includes a simple word processor with fairly complete text editing capabilities. A spelling checker is also included.

Powerpoint does not offer direct film camera support. When a presentation has been constructed, a communications program can be used to send the file via modem to one of Genigraphics' centers for slide or photo processing.

The package comes with a comprehensive 400-page hardbound user's guide that is superbly organized and amply illustrated. About the only feature missing from the Powerpoint package is an on-line tutorial. On-screen Help is exceptional.

Microsoft offers unlimited free (but not toll-free) technical support on weekdays from 6 a.m. to 6 p.m. PST. The support staff is courteous and knowledgeable.

At $495, Powerpoint sets a new standard for making and orchestrating quick, easy and professional presentations.

Microsoft Corp., 1 Microsoft Way, Redmond, Wash. 98052, (206) 882-8080.

Paradox Engine revs up programming control

Borland International's Paradox Engine is a set of C libraries that provides many of the data-handling functions of the Paradox database.

It includes libraries for Borland's Turbo C 2.0 and Microsoft Corp.'s C 5.1. Only the large memory model is supported. According to Borland, the next version, which is due out this fall, will support Microsoft's Windows 3.0, Turbo Pascal and object layers for Turbo C++ and Turbo Pascal.

The C functions in Paradox Engine provide for database creation, modification, manipulation and controlled access. The engine can be used to create standalone applications that access Paradox data files or miniprograms for integration into Paradox Application Language (PAL) programs that run under the Paradox database.

Most of Paradox Engine's functions are lower level, meaning that each one performs a fundamental operation and is usually grouped with other low-level functions to perform one higher level function. A few higher level functions that simulate features in the Paradox database's menu are also included.

Paradox Engine provides the full range of locking capabilities for use on a network. There are also functions that let users add and delete passwords as well as encrypt and decrypt data.

Paradox Engine lets users create and access the three index types available with Paradox: primary, incremental secondary and nonmaintained secondary. The engine can automatically maintain primary and incremental secondary indexes. The programmer must update nonmaintained indexes.

Paradox Engine implements five data types: numeric, money, short integer, date and character. Dates are stored as long integers, and numeric and money data types are stored as floating point. The storage of long integers places no real burden on the programmer, because Paradox Engine has functions to encode and decode dates.

One of the main advantages of a C development tool kit over a high-level language is that it gives the user control over all the minute details of a program.

Continued on page 60

Reviews are compiled from information supplied by *Infoworld*.

Paradox

CONTINUED FROM PAGE 59

Overall, Paradox Engine provides functions in enough detail to afford a great deal of control over access to data, but it doesn't overly burden the programmer with responsibilities for less useful details. It is a fairly well-balanced set of C database functions.

Paradox Engine comes with a user manual, a quick-reference guide, C program examples for using all the available functions and a few complete sample programs. The user manual is well organized and has good examples.

Accessing data in Paradox files through C functions is so complex that it requires excellent documentation and good sample programs for users to start programming quickly.

The quick-reference guide that comes with Paradox Engine is a simple but ideal solution.

Paradox Engine is easy to use as C tool kits go. If it supported more high-level functions, it would be even easier.

Paradox Engine traps hardware errors on its own. It offers a range of error codes for various situations such as attempting to open a corrupt table.

Paradox Engine Version 1.0

Price: $495

- Performance: Good
- Documentation: Excellent
- Ease of learning: Excellent
- Ease of use: Very good
- Error handling: Excellent
- Support: Good to excellent
- Value: Excellent

The vendor offers unlimited free support via a non-toll-free line, Compuserve and facsimile. Borland also provides extended support hours, a 60-day money-back guarantee and corporate extended support plans. The support people respond quickly and accurately.

Paradox Engine, priced at $495, is so easy to use and learn that it is a must for any Paradox user who needs more power than PAL has to offer.

Borland International, 1800 Green Hills Road, Scotts Valley, Calif. 95066, (408) 438-8400.

Pastore

CONTINUED FROM PAGE 55

share leader. But to ensure this leadership for another decade, IBM should heed users' complaints. Though some of the following suggestions have been brought up in the past, they bear reiteration:

1. Price aggressively. The minor price restructuring of the past year has not had much effect on the budget-conscious. IBM should skip the namby-pamby, sporadic price cuts like the recent 3% to 8% reduction on Personal System/2 Model 25s. (Three percent? That doesn't even pay the state sales tax in most places.) To really startle buyers and change their perceptions, IBM needs a dramatic across-the-board cut — especially since Compaq just knocked about 20% off most of its product line.

2. Fill in product line. How can a company call itself a first-tier vendor when it has no practical portable or dedicated servers — with or without multiprocessors? Users may begin asking the same question unless IBM delivers a viable laptop computer, dedicated servers and a multiprocessor system this fall.

IBM has already filled a hole in the home market segment with its PS/1. But right now, its product line still looks like swiss cheese next to Compaq's.

3. Speed up or spruce up. If you're going to be late to market, at least be better once you arrive. It's asking a lot of a lumbering behemoth like IBM to beat its nimble competitors to market. Yet, wouldn't it be nice if, when the machines showed up, they had second-generation features that improved on the others?

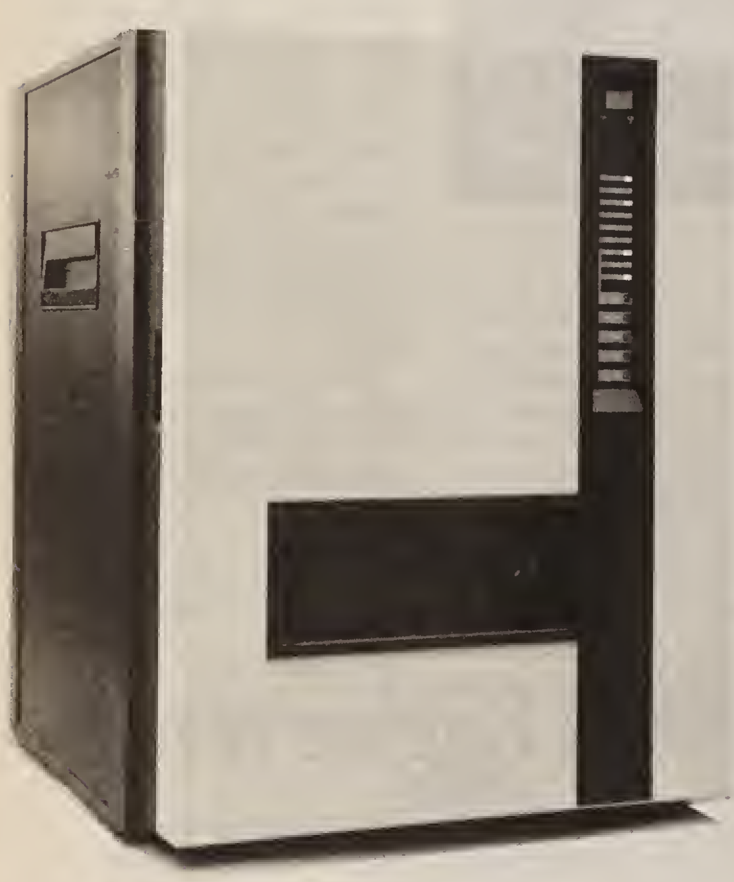
Sadly, no one expects IBM's rumored laptop or servers to be any more innovative or exciting than what's been out there for almost a year. In contrast, Compaq's diskless network PCs were not the first such machines to arrive, but they had novel security and networking features that make them better than the rest. Take a lesson here, IBM.

4. Spit and polish. Put a little production effort — or at least some advertising effort — into restoring an image of peerless quality. Compaq has cemented that reputation among the first-tier vendors. Dell is earning it in the second tier.

5. Embrace EISA. Among those rarified individuals who give a hoot about what kind of bus their PC has, most seem to favor the Extended Industry Standard Architecture (EISA). It seems almost every PC vendor offers EISA, and users and third-party peripheral developers are starting to take notice. Meanwhile, users who have bothered to check say they find no performance advantage with IBM's rival Micro Channel Architecture (MCA) bus.

To avoid being stuck with some kind of bus albatross or white elephant, IBM should swallow its pride and offer both EISA and MCA. Other, smaller vendors have found it possible to sit on both sides of the bus fence; why can't IBM?

Pastore is a *Computerworld* senior writer.



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Upgraded Clipper snips away memory limits

BY JAMES DALY
CW STAFF

LOS ANGELES, Calif. — Nantucket Corp. began shipping an update of its Clipper application development system this month featuring a revised memory management function that removes limitations on the size of DOS applications developers can create.

Clipper 5.0's Virtual Memory Management (VMM) system is designed to allow developers using personal computers to write the type of large and complex applications previously confined to mainframes and minicomputers, Nantucket President Larry Heimendinger said.

VMM consists of two software subsystems that divide memory tasks. The "segmented" virtual memory subsystem addresses up to 64M bytes of memory, while a separate object memory unit manages character and array values generated by Version 5.0 applications. The object memory subsystem also automatically reclaims memory occupied by values no longer needed.

When teamed with Clipper's dynamic overlay linking, which permits developers to build and run applications larger than available main memory, VMM allows developers to write programs with no practical memory limitations, Nantucket officials said. "Developers can concentrate on writing the best possible application without worrying about how big or complex it is," Heimendinger said.

Clipper 5.0 will sell for $795, and registered users of previous versions can upgrade for $195.

MICRO BITS

NCR resells with Pacer

NCR Corp. and **Pacer Software, Inc.** have announced a cooperative marketing agreement to resell NCR's Tower line of supermicrocomputers and Pacerlink Software.

Archive Corp. subsidiary **Ardat** and **Hewlett-Packard Co.** have agreed to use the same data compression technology — DCLZ — on their digital data storage systems.

Rasterops Corp. has signed an OEM pact with **Digital Equipment Corp.** to develop a high-resolution color display capable of combining 24-bit color graphics with on-screen television and video for DEC's family of reduced instruction set computing workstations. Initial shipment of the product is slated for the first quarter of 1991.

Fox Software, Inc. will publish a developer's directory that will include listings of Foxpro, Foxbase+ and Foxbase+/Macintosh developer, vertical applications and third-party enhancement products. The *1990-1991 Fox Software Developers Directory* will be available next month for $24.95.

A $20 rebate coupon for **Traveling Software, Inc.**'s Laplink Macintosh III will ship with every copy of **Aldus Corp.**'s Pagemaker Version 4.0. Laplink is a file transfer utility that allows Apple Computer, Inc. Macintosh computers and IBM Personal Computer compatibles to exchange files. The offer expires March 31, 1991.

Robotron, East Germany's largest computer and electronics conglomerate, has signed a distribution pact with **AST Research, Inc.** that will allow AST to expand its sales in Eastern Europe.

DG coaxes Unix users

BY SALLY CUSACK
CW STAFF

WESTBORO, Mass. — By introducing a vector processing version of the Aviion reduced instruction set computing-based system recently, Data General Corp. is hoping to lure larger numbers of systems integrators, laboratories, contractors and exploration firms into its Unix-based workstation camp.

The Model 5069 is a 32-bit single-precision, single-board system that performs up to 66 million floating-point operations per second (MFLOPS).

According to the vendor, as many as eight Model 5069s can be interconnected for a maximum of 528 MFLOPS in a single-chassis environment. The system incorporates an industry-standard VMEbus data bus and is available in configurations with 2M bytes and 8M bytes of memory, priced at $8,995 and $12,195, respectively.

The company also announced three VMEbus interfaces for connecting Aviion systems to external systems and peripherals: the Model 5089/5099 for use with Digital Equipment Corp.'s DR11-W devices; the Model 5517 for IEEE-488 connections; and the Model 5400, a general-purpose interface for high-speed parallel block transfer functions between Aviion computers and external devices.

Pricing for the interfaces ranges from $1,895 to $4,495. All of the products are available immediately.

Multimedia

FROM PAGE 55

specifications for the Context product line, including which fabrics are available for which pieces of furniture. It also contains modules that give designers different views of the product.

The planning system allows designers to plan entire offices, right down to simulating office lighting.

The minimum hardware requirement is a Macintosh II with a color monitor.

Steelcase went with the system in the fall of 1988. It contracted with Santa Fe Interactive to write and produce the information system and worked with Apple's Integrated Systems Group to develop the planning system. Eventually, the work was transferred to the Palo Alto, Calif., office of KPMG Peat Marwick. Steelcase sent several employees to KPMG to learn the development process and in July of this year brought the project in-house, for economic reasons and control.

Using its new multimedia secret weapon — based on Apple's Hypercard and Macromind, Inc.'s Director — Steelcase unveiled the new product line at the Neocon trade show in 1989. The company walked away with the best of show award.

Steelcase picked Apple because "we wanted to work with a computer that didn't feel like a computer," Greiner said.

The project has three target markets:

1) Steelcase's 450 distributorships, for use as a sales tool.

2) The architectural and design community, which specifies furniture for new offices. "Context has 500 pieces in it, and these people have very limited amounts of time to learn these products," Greiner said.

3) Customers, so that they can get a quick and easy orientation in the Context line.

Spread nationwide

Besides the dealers, the system has been installed in area offices in New York, Los Angeles, Chicago, Toronto, Atlanta, Grand Rapids, Mich., and San Francisco and will ideally be installed in all 30 of Steelcase's area offices.

Greiner said that dealers in general react cautiously to the new system. "They're still weighing whether the investment in the hardware and software is worth it for one product."

It is a good question, particularly when those with computers are generally using IBM and compatible systems. However, Greiner said that Steelcase, which would not disclose its investment in the project, is firmly committed to multimedia technology and will develop similar applications for all of its major new product lines.

Just because Steelcase developed its first project on a Macintosh platform does not mean it will stay there. Greiner said that IBM has greatly improved its multimedia efforts, and Steelcase would certainly consider moving to the IBM platform.

"It would be more convenient," Greiner said. "But the key is, where is the solution best manifested?"

For now, the answer is Apple.

Greiner also pointed out that Steelcase does not expect to replace its printed catalogs at any point in the future. Multimedia applications will simply be an additional tool.

Greiner said that work on this project has opened some eyes at Steelcase.

"It's raised our expectations of all applications," he said. "They all should be fun to use; we shouldn't have to accept boring-looking spreadsheets. We go back to IBM and [tell them that] applications should be quick, simple, easy to use and intuitive."

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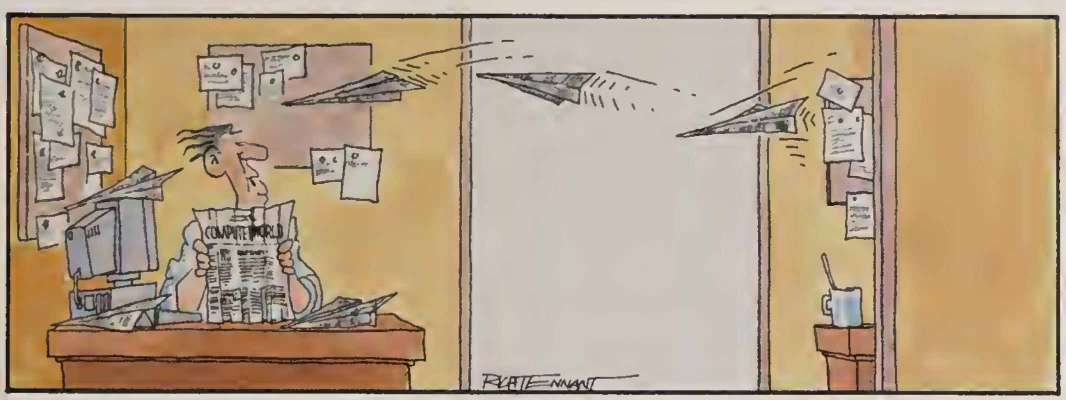

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   - **E.** Local Area Networks
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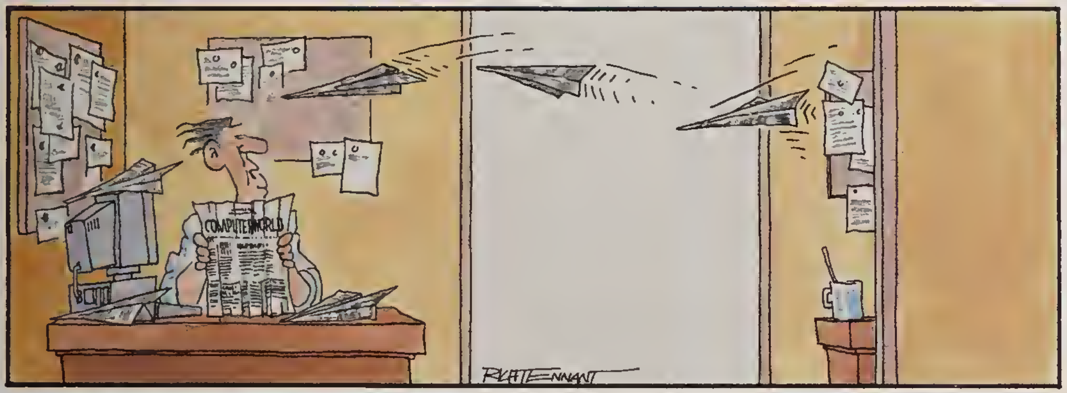

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   - **80.** Educator, Journalists, Librarians, Students
   - **90.** Others ______ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply)
   Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - **A.** Mainframes/Superminis
   - **B.** Minicomputers/Small Business Computers
   - **C.** Microcomputers/Desktops
   - **D.** Communications Systems
   - **E.** Local Area Networks
   - **F.** No Computer Involvement

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NETWORKING

COMMENTARY

Walter Ulrich

Living private E-mail lives

Electronic mail privacy issues spring to the surface every few years. A few years ago, archiving of E-mail made headlines as old IBM Professional Office System (Profs) messages played a role in the undoing of Oliver North. Recently, the Epson America and city of Colorado Springs cases have raised related questions: What level of privacy are users of business E-mail systems entitled to expect?

Messages sent between two companies via a third-party service have excellent privacy protection. First, the Electronic Communications Privacy Act of 1986 protects electronic communications in a way similar to the wiretap statutes that apply to telephone calls.

Second, it is more difficult for a wiretapper to make sense of E-mail than it is to listen to a telephone conversation. Identifying and decoding a specific electronic message from a bit stream over a busy communications line is a formidable task.

Companies that run and own their own private E-mail systems, however, must deal with issues that do not apply to E-mail service users. Among the most crucial: What privacy rights does

Continued on page 64

LANs can now talk over SNA

BY ELISABETH HORWITT
CW STAFF

Third-party vendors are stepping in to meet the needs of IBM users who want economical ways to interconnect their local-area networks to one another and to IBM hosts via the same box. IBM recently began moving to bridge the gap between its LAN and Systems Network Architecture (SNA) but at a pace slow enough to leave gaps for third parties to fill.

Two years ago, IBM took the crucial step of allowing its Network Control Program to support the PU2.1 peer-to-peer protocol, which allows devices supporting PU2.1 to communicate directly over a backbone of front-end processors without having to go through the host. LANs can talk to each other and to IBM hosts via that backbone, as long as they are equipped with a gateway that supports PU2.1.

Two vendors announced such gateways at the recent Networld '90 Dallas conference. Phaser Systems, Inc. introduced LU6.2 and PU2.1 support for its Novell, Inc. Netware SNA router. That will allow Netware LANs to use the SNA backbone to communicate directly with one another or with other PU2.1 systems such as IBM Application System/400 hosts, Phaser said. The router already supports SNA connections to IBM MVS and VM hosts.

Also at Networld '90, Harris Adacom Corp. in Dallas introduced the Strategy 9770 Intelligent Token-Ring Gateway. The product is said to provide bidirectional, PU2.1-based links between Transmission Control Protocol/Internet Protocol (TCP/IP) Ethernet networks and IBM SNA 4M/16M bit/sec. Token-Ring LANs.

The Travelers Corp. recently discovered that an OS/2 server running LAN Manager also has the PU2.1 capability to provide LAN-to-LAN connections over its front ends.

However, the insurance giant drew back from implementing this interconnectivity strategy because it wanted its users to be able to communicate via protocols other than SNA, according to a company spokesman [CW, Sept. 3].

IBM recently introduced a program that is said to encapsulate Netbios transmissions in SNA envelopes so that they can run over SNA backbones. And Mitek Systems Corp. in Carrollton, Texas, offers gateways that encapsulate TCP/IP so that it can run over SNA.

However, this method of bridging two networking environments is too slow to support any but the least demanding of LAN-to-LAN transmissions, sources said. A more direct solution would be for IBM host front ends to support other protocols besides SNA.

IBM is reportedly working on both Open Systems Interconnect (OSI) and TCP/IP support for its front-end processors. Meanwhile, NCR Comten has already implemented TCP/IP on its own IBM-compatible front-

Continued on page 65

Study says IBM connectivity limited

BY JOANIE M. WEXLER
CW STAFF

In an era in which managers see data traffic boldly venturing off its own local-area network to other networks and hosts, LANs in IBM shops are proving to be more provincial than Digital Equipment Corp. VAX-based networks, according to a recent study by Computer Intelligence (see story above).

The La Jolla, Calif.-based market research firm, which surveyed the 25,000 U.S. sites housing either a VAX minicomputer or an IBM mainframe, determined that VAX-equipped LANs are more likely to be communicating with another LAN or host than are networks connected to IBM mainframes.

Federal government and Fortune 1,000 sites are among the largest users of LANs, and about 62% of them are on speaking terms with another LAN or host. By contrast, about 55% of the large IBM mainframe sites are communicating with other systems or networks, according to Computer Intelligence.

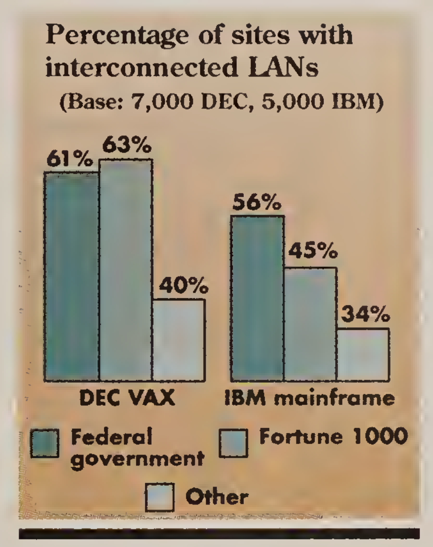
"The installed base today somewhat reflects the historical emphasis of the vendors," explained Bruce Coughran, a communications industry analyst at Computer Intelligence. "IBM has traditionally been more hierarchical, while DEC's strategy is more peer-to-peer oriented."

The same DEC/IBM LAN interconnection relationship holds true, the study said, for other sites, including smaller companies and some universities — although university environments often mirror the heterogeneous government networking environment, Coughran said.

Cliff Worth, a senior consultant at Arthur D. Little, said, "The deterministic nature of the token-ring architecture makes it easier to predict traffic flows, so it is becoming more desirable than Ethernet for some users. But there are still a lot of IBM shops out there with isolated Token-Rings because of the traditional mainframe orientation in the IBM world."

Bridgework

Companies with DEC VAXs are more likely than IBM mainframe sites to interconnect LANs



Source: Computer Intelligence
CW Chart: Chuck Fletcher

Who was the first bank automation company to produce a computer with 486 chip technology?

Here's a hint: It's not IBM or DEC.

Videotex lets ailing travelers rest easy

ON SITE

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — It is scary enough to suddenly need hospitalization while traveling in a foreign country. But then there is the question of how to pay the hospital bill, especially when credit cards are not accepted.

One company coming to the rescue is Group Hospitalization and Medical Services, Inc. (GHMSI), an insurance conglomerate that has made arrangements with hospitals in about 67 countries to provide direct payment of hospital bills for GHMSI's 200,000 traveling customers.

However, this convenient system only works if the hospital can get immediate verification that the patient is eligible under GHMSI insurance.

GHMSI has taken the unusual approach — unusual for an American firm, at least — of adopting France's Minitel videotex system to solve this international networking problem. The result is that hospitals can get fast confirmation of eligibility, regardless of languages, time zones and holidays.

For many Americans, Minitel is too simple and too, well, European. "Our data processing people were highly skeptical," said Ruth A. McKenty, director of GHMSI Europe and Asia. Americans resist Minitel because "it's not a U.S. product with an IBM mainframe and dozens of programmers," she said.

However, GHMSI, a company with an international outlook, was familiar with Minitel in its Paris office, where the French videotex service is used mostly for making airline reservations.

After flirting with some very expensive options, GHMSI decided that a Minitel-based system would be much more cost-effective for an application that involves infrequent bursts of traffic but requires 24-hour access to the database, project manager Jacquelyn Hartley said.

GHMSI

The application was designed and implemented by Information Systems Experts, Inc., a Washington, D.C.-based systems integrator that continues to operate the system for GHMSI. User costs include the original contract of $20,000 and a fee of $2,500 per month for continuing operations and maintenance, plus Minitel per-minute usage charges.

The videotex service, known for its graphics displays and easy-to-learn function keys, is provided by Minitel's U.S. marketing arm, Minitel Services Co. in Purchase, N.Y., which uses Infonet Corp.'s X.25 backbone network to carry the transmissions.

Hartley said that in a typical scenario, the Minitel-based system works like this:

- A traveling subscriber shows up at a foreign hospital with a GHMSI identification card. The hospital calls GHMSI's World Access, Inc. subsidiary in Washington, D.C., where a multilingual staff is on hand 24 hours a day to answer the phone.
- The World Access employee uses a Minitel terminal to look up the subscriber's record and verify the insurance coverage while the hospital is still on the phone.
- The database of eligibility records — just a small subset of the complete insurance database — runs on an Intel Corp. 80386-based microcomputer with a 150M-byte hard disk. The eligibility records from GHMSI's foreign insurance partners are updated on-line via the Minitel network or magnetic tapes.

Hartley explained that because GHMSI acts as a reinsurer for its foreign insurance partners, the system requires access to the eligibility data contained in the partners' insurance databases. Instead of duplicating the partners' entire customer databases on GHMSI mainframes, GHMSI is taking the much simpler route of loading just the essential data onto the personal computer database.

In addition, GHMSI's International Division uses Minitel for basic electronic mail communications among offices in the U.S., UK, France, Mexico and Ireland, Hartley said.

Dick Groppe, president of the International Division, said he is considering other Minitel-based information systems, including development of an executive information system that would provide managers with summaries of international financial data.

Ulrich

FROM PAGE 63

the firm have, and what privacy rights do employees have?

When a company owns or leases E-mail systems or services for its employees' use, the company has a definite right to privacy. Wiretapping or hacking by third parties is clearly illegal under a variety of privacy, computer crime and other laws. The company's electronic information is protected.

Employees, on the other hand, have no a priori right to protest the privacy of company electronic messages from their company. The company, after all, owns (or leases) the system and the messages. Therefore, the company has broad latitude in its behavior with respect to its E-mail.

An electronic message is analogous to a paper memo. Information in memos is often freely shared among workers. This kind of information sharing is essential to the smooth and effective functioning of an enterprise.

It would be a big mistake to accord electronic communications privacy restrictions different than those accorded to paper communications. One of the justifications for E-mail is that it enables faster sharing of information. It would be wrong to begin chipping away at that benefit with bureaucratic regulations or government intrusion.

Mike Cavanagh, executive director at the Electronic Mail Association located in Washington, D.C., points out that there are often situations in which we would want a colleague to retrieve information. For example, if I am away on an emergency, I would want a colleague to search for that nearly completed proposal, complete it and send it to my client before the deadline.

There are several justifiable reasons for someone in a company to access another person's electronic information:

- Routine sharing of information in the course of business.
- Suspicion of theft of trade secrets or computer crime.
- Investigation of other criminal activity, such as drug dealing, gambling and fraud.

However, companies should never allow electronic fishing expeditions. Snooping is counterproductive and in bad taste.

There are 10 million users of E-mail, and questionable practices are so infrequent that they make the news. Common sense has worked well so far, but as volumes grow, the incidence of problems will increase. Companies should establish electronic record management policies that include privacy guidelines.

E-mail privacy guidelines should do the following:

- Encourage fast and free sharing of electronic information.
- Prohibit an overzealous supervisor from electronic snooping, except under special circumstances.
- Reserve the company its proprietary rights in its electronic information.

People should use E-mail freely in the conduct of their company's business. Individuals should protect their passwords carefully and change them regularly. Above all, users should conduct themselves in the same professional and prudent manner when using E-mail as they do in other aspects of their business life.

If you suspect that electronic snooping is occurring in your company, use proper channels to inform an officer of the company. If it is permitted to continue on a routine basis, you may well question whether it is the kind of organization with which you want to be associated.

The privacy of E-mail is better than that of paper mail. An electronic message is handled by fewer people and is less subject to interception or modification. A commonsense policy on privacy will encourage responsible use of E-mail while preventing unfortunate incidents that could have embarrassing and far-reaching implications.

Ulrich is client services director for the information and telecommunications systems consulting section at Arthur D. Little, Inc. in Cambridge, Mass.

INC delivering hybrid ISDN system

BY ELLIS BOOKER
CW STAFF

BRIDGEWATER, N.J. — Integrated Network Corp. (INC), which made a name for itself with networking gear that offers many of the digital features of the Integrated Services Digital Network (ISDN) without ISDN, recently announced its first ISDN-compatible system.

Remaining true to its history, however, INC's CM-384/PRI, which can access an ISDN Primary Rate Interface channel, is said to be the first ISDN product that can also work with 56K bit/sec. systems, specifically INC's own line of 1056 series 56K bit/sec. channel service unit/data service units.

The latest product offers access speeds from 56K bit/sec. to 768K bit/sec. in 56K or 64K bit/sec. increments and will initially support AT&T's Switched 384 service, according to INC.

"I'm not aware of another 384 switched product," said Dataquest, Inc. analyst Larry Cynar, noting that INC has pushed hard in the 56K/64K bit/sec. market and that a number of vendors are reselling INC's boxes under their own nameplates.

Initially, the CM-384 will have two ports, each capable of running from 56K bit/sec. to 384K bit/sec. The unit, which can perform automatic rate adaption when connecting to INC 56K bit/sec. devices, is also said to be able to work behind standard T1 muliplexers.

"Next year, we'll have a software upgrade making each port [compatible] with a 1.5M bit/sec. service," said INC Vice-President of Marketing Craig Bender, who plans to demonstrate the product at the Tele-Communications Association show in San Diego this week.

Bender said he expected AT&T to announce its 1.5M bit/sec. switched service by the end of 1991, once its network of 400 or so toll switches is upgraded.

Cynar noted that the value of INC's device may be nominal until and unless local exchange companies provide variable, high-speed access into long-distance services.

The CM-384 will be available in the fourth quarter at a list price of $5,995 for the rack-mount version.

It's Olivetti.
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Olivetti doesn't just make typewriters anymore. We've grown to be the largest bank automation company in Europe. And the third largest MS-DOS PC manufacturer in the world. With over $7 billion in revenues. And now that we've brought together ISC-Bunker Ramo, who do you think is committed to having the number one bank automation company in America? You guessed it.

US West beefs up recovery service

BY ELLIS BOOKER
CW STAFF

DENVER — Local telephone companies are beefing up their networks, adding redundant and intelligent features to make them better able to respond to outages and protect customers' critical on-line applications.

Two weeks ago, US West Communications won regulatory approval for its high-speed network recovery and restoration services. US West claims to be the first of the seven regional Bell holding companies to develop and market such services, which automatically reroute a customer's telecommunications traffic around failed network nodes.

"All the regionals have looked at this from time to time," said Thomas L. Nolle, president of CIMI Corp. in Voorhees, N.J. Nolle said he was surprised US West had entered the market first, given that the largest concentration of financial services and brokerage firms — historically the users with the most pressing need for backup services — are located in New York and Chicago, which are served by Nynex Corp. and Ameritech.

Network recovery at the local phone company level is "natural because of the acceptance of the idea of disaster recovery for private networking," and it will increase in proportion to the delivery of virtual network services using public facilities, Nolle said. But, he added, large users may be uncomfortable with the concept of a network-generated switchover.

"A lot of users feel that the only person who can switch to the backup is them," Nolle said. He added that "millisecond" backup switching on public networks, which has only been available recently with the deployment of intelligent cross-connect systems, is of dubious advantage if the customer's backup data center cannot handle millisecond switchovers.

A SHARP edge

US West's Self-Healing Alternative Route Protection (SHARP) service, an option for DS1 or DS3 customers, offers alternative routing around failed network nodes over fiber-optic facilities. The service will be deployed in five US West markets: Minneapolis-St. Paul, Denver, Seattle, Phoenix and Portland, Ore. A second service, called Self-Healing Network Services (SHNS), is for custom-built networks and provides redundant facilities through a counter-rotating fiber ring for DS3 private network customers. It is available throughout US West's territory.

SHARP will be available in a phased rollout, starting with Minneapolis-St. Paul this month and entering the other four markets by July 1991.

Pricing for SHARP can range from about $370 per month for a single T1 circuit to as much as $4,000 per month per DS3 circuit. SHNS costs from $25,000 to $46,000 per month, depending on number of nodes and locations.

To back up its claims of reliability, US West is offering a one-month credit to customers if they experience as little as one second of downtime on the redundant networks. Both tariffs were approved earlier this month by the Federal Communications Commission.

Connectivity

CONTINUED FROM PAGE 63

end processors and plans to ship OSI support for its offerings by early next year, a spokesman said.

The Minnesota legislature became a beta-test user of Comten's TCP/IP product running on a Comten front end last January. The legislature had determined that it needed more terminal-to-host throughput than was provided by its "ancient" IBM 3705 front end, according to Robert McClung, the legislature's data processing manager.

The organization upgraded to a Comten processor rather than to a larger IBM front end because it wants to eventually use TCP/IP for both LAN and micro-to-mainframe communications, McClung said. IBM does provide TCP/IP for its hosts, but the software reportedly takes up a tremendous amount of mainframe processing power, he added. In contrast, Comten's front ends provide translation from TCP/IP to SNA so that the IBM host can still talk in its native language.

If IBM front-end manufacturers are invading LAN interconnectivity vendors' territory, the router companies are striking back by turning their devices into SNA gateways. Indeed, IBM's own 3172 Interconnect Controller now links both SNA and non-SNA hosts to a variety of LANs. The vendor is considering whether the 3172 will become a LAN-to-LAN platform as well, an IBM spokesman said.

The following offerings are from the third-party arena:

- Eicon, Inc. in Montreal is offering a personal computer card that is said to support SNA, Netbios, TCP/IP, Novell, Inc.'s IPX and OSI. Eicon is working on adding Integrated Services Digital Network and frame relay links to its product.
- Proteon, Inc. in Westboro, Mass., recently introduced a bridging router that supports IBM's 16M bit/sec. Token-Ring and source routing protocols, as well as IPX, TCP/IP, Apple Computer, Inc.'s Appletalk, Digital Equipment Corp.'s Decnet and OSI.
- Cisco Systems, Inc. in Menlo Park, Calif., is offering a router that supports the same protocols as Proteon's device, as well as others.

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NEW PRODUCTS

Local-area networking hardware

Tecmar, Inc. has announced a family of server-based tape backup and optical-disc subsystems for Novell, Inc. networks.

Proline is attached to a network's central file server so backup procedures can be performed without a dedicated workstation and without requiring server data to be sent across the network. Data transfer rates of 240K byte/sec. are possible using Proserve, a network management software package that functions as a Novell Value-Added Process under Netware 286 and as a Network-Loadable Module under Netware 386.

Pricing ranges from $2,595 to $8,495, depending on configuration.

Tecmar
6225 Cochran Road
Solon, Ohio 44139
(216) 349-0600

David Systems, Inc. has announced two Ethernet 10Base-T adapters designed for use in IBM Personal Computer environments.

The Ether-T PC/AT and the Ether-T MC both establish local-area network connections using ordinary telephone lines. The former model was designed for use in an 8- or 16-bit bus IBM PC XT, AT, Personal System/2 Model 30-286 or compatibles. The latter model can be used in IBM PS/2 and compatible PCs using Micro Channel Architecture.

The adapters are priced at $350 for the Ether-T PC/AT and $460 for the Ether-T MC.

David Systems
701 E. Evelyn Ave.
Sunnyvale, Calif. 94086
(408) 720-8000

Network management

Candle Corp. has introduced a VTAM monitor that complies with IBM's Systems Application Architecture (SAA) and Common User Access (CUA).

Omegamon II for VTAM enables users to analyze VTAM performance and determine if short-term network problems are caused by VTAM or other network components. It includes an SAA/CUA interface that facilitates VTAM command entries and a Netview hot key that provides easy access to IBM's Netview.

First CPU pricing ranges from $20,000 to $60,000, depending on site size.

Candle
1999 Bundy Drive
Los Angeles, Calif. 90025
(213) 207-1400

Links

Intervoice, Inc. has introduced an integrated digital version of its Robot Operator system that features full T1 support.

The system's Intervoice Vocalcard/Digital voice card provides 24-channel capacity in a single slot of an IBM Personal System/2 and is fully integrated with T1 capabilities.

The product is priced at $1,625 per channel for a T-Span of 24 channels and less than $1,000 per channel for 96 channels or 4 T-Spans.

Intervoice
17811 Waterview Pkwy.
Dallas, Texas 75252
(214) 497-8720

CE Software and Solutions, Inc. has announced a communications enhancement that was added to Quickmail, its electronic mail package designed for users of Apple Computer, Inc. Macintosh systems.

Faxgate Plus was developed as a Quickmail-based gateway that enables users of local-area network mail systems to share its Backfax modems or compatibles.

Faxgate Plus requires a Macintosh Plus or higher version with 2M bytes of random-access memory, a hard drive and Quickmail Version 2.2 or higher. It is priced at $395.

CE Software and Solutions
P.O. Box 65580
1854 Fuller Road
W. Des Moines, Iowa 50265
(515) 224-1995

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MANAGER'S JOURNAL

EXECUTIVE TRACK

Tom Cash has been appointed vice-president and chief information officer at **Sara Lee Knit Products** in Winston-Salem, N.C., makers of Hanes, Stedman and Pannill clothing.

Cash previously served as director of Sara Lee Knit Products' sales, marketing and distribution systems. Before that, he was president of management consulting firm SBE Associates and vice-president of systems at Cannon Mills Co. He also spent some time at Sara Lee Corp., parent company of the Knit Products division, as a consultant.

Cash holds a bachelor's degree from Wake Forest University and a master's degree from the Georgia Institute of Technology.

……

Dennis Connor, the former head of IS at Greyhound Lines, Inc., has been named director of MIS at **Epic Healthcare Group**, a Dallas-based firm operating 39 hospitals in 10 states.

After leaving Greyhound, where he was senior director of IS, Connor joined Epic last May as interim director of MIS. Epic is the third largest employee-owned company in the U.S., with 10,000 employees.

Connor's 20-year IS career has included positions at Ericsson, Inc., Texas Instruments, Inc., Kimberly-Clark Corp. and Electronic Data Systems Corp.

He holds a bachelor's degree in naval engineering from the U.S. Naval Academy and an MBA from Texas Tech University.

……

Who's on the go?

Changing jobs? Promoting an assistant? Your peers want to know who is coming and going, and *Computerworld* wants to help by mentioning any IS job changes in Executive Track. When you have news about staff changes, be sure to drop a note and photo to or have your public relations department write to Clinton Wilder, Senior Editor, Management, *Computerworld*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.

IS management: A campus view

Harvard professor urges students to seek firms where tech is 'a big deal'

The most far-reaching change in the world of information systems management during the next five to 10 years may be the blurring of the distinction between careers in IS and general business management. One individual with a particularly clear perspective on this issue and many others in IS is F. Warren McFarlan, the Ross Graham Walker professor at Harvard Business School.

Computerworld senior writer David Ludlum recently spoke with McFarlan on the Harvard campus in Cambridge, Mass.

Steven Lewis

Warren McFarlan: *IS managers should focus on the needs of end users*

A few years ago, there was concern that the best business school talent was heading for Wall Street at the expense of other callings. Is that still an issue, and has it affected the information technology area?

We were very concerned at the high percentage of our class that was going to Wall Street three or four years ago, and we began restricting sharply the number of people entering the school from Wall Street financial institutions. We went hard after people whom we considered did real jobs, which would be in information processing, marketing, production and sales.

Is that still a concern?

Oh, yes. We're continuing to focus on people who have an orientation in that direction.

Do many Harvard MBA graduates go into IS management positions?

My guess is it's a relatively limited number of people. Most of them are going off into marketing or production types of jobs. It might be 5% of the class or 7% of the class that would go into IS management.

Part of the reason for that, of course, is that a number of the IS management positions are filled by people coming right out of the technology side. Two years here doesn't give that kind of apprenticeship.

How much should the general manager know about information technology?

We don't waste a lot of time teaching people the intricacies of relational data architecture or the technical performance of different kinds of local-area networks because that technology tends to be very specific to a point and time. But in terms of developing an understanding of how the technology is changing organizational structures, how it's allowing new kinds of control techniques to be created, how it's improving responsiveness in the company, how it's opening up new channels of distribution, how new forms of elec-

Continued on page 72

The *wrong* way to implement an EIS

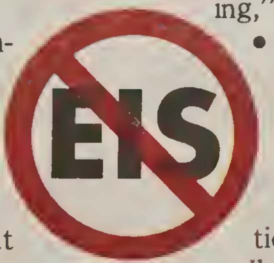
BY CLINTON WILDER
CW STAFF

Companies that don't view an executive information system (EIS) as a major development effort are in for a rude shock. That is something Mutual Benefit Life Insurance Co. found out the hard way.

The Newark, N.J.-based company is considered a leader in the use of IS to transform its business. However, during the recent Society for Information Management conference in New York, June Drewry, senior vice-president of corporate planning and systems development at Mutual Benefit, gave a refreshingly candid account of an EIS that failed.

The mistake most companies make is thinking that creating an EIS is easy, Drewry said. Installing a vendor's EIS package onto executives' personal computers is really a very small percentage of the effort — and the cost — of the project.

"If you don't think about the costs of gathering and massaging the information, the hardware and software looks great and is easy to justify," she said.



Mutual Benefit chose Comshare, Inc.'s Commander EIS two years ago and had a prototype system running by May 1989. But the system never caught on, for a variety of reasons that Drewry ticked off:

- Not enough effort was put into what data the executives wanted, how soon and in what form.

"The job of 'information provider' to the system was not a full-time job, and it should have been," Drewry said. As a result, sales information and other important financial data was only available in the EIS monthly or quarterly. "It was not very different from the data they already had," she said.

- Lack of one committed senior executive sponsor. "We've had five different sponsors, and that has been devastating," Drewry said.
- Failure to approach the EIS as a major application project with formal methodology and adequate systems programming talent. "You wouldn't bring an application to prototype and then walk away, but that's what we tend to do in EIS situations," she said.

What is in the cards for future EIS efforts at Mutual Benefit? "The CEO wants to take another shot," Drewry said, "but IS is understandably gun-shy."

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CONTINUED FROM PAGE 69

tronic technology enable strategic alliances — those are really big things, and we have a required course in the first-year MBA program.

What are the major challenges that will be facing IS managers in the next five years?
A series of issues. The first one is the continual forging and maintenance of the partnership between them and key end-user constituencies. A second set of issues is helping to identify and work with end users to think about potential ways in which new technologies can be applied.

It's a really hard area, because traditionally that information technology function was very specialized, very remote from the rest of the organization, often working on problems other than those absolutely essential to corporate survival, and as all of those things have changed, it's put the function in incredible turmoil.

What advice do you give students interested in going into IS management?
I think we have much fewer of them that are interested in that than other schools do. There is a very strong general management orientation that our students have. Their interests as they come out are major positions of profit center and corporate leadership. It's a much smaller group that aspires to major leadership roles on staff activities like information systems. And that's just really a function of the mission of this school.

Does that mean going into IS is inconsistent with reaching a position of significant responsibility for a profit center?
I think that if we look for where the successful information systems manager will come from in the early 21st century, we will find them having had significant positions in both end-user departments as well as in the information systems function. They can enter the organization in either way. The key thing is they have to spend time on each side.

Now, look at it quite bluntly. Students coming out of Harvard Business School carry along with them a $65,000 debt. Heavily focused on their minds are career opportunities and jobs that will allow them to extinguish the debt at a satisfactory rate so they can sleep better at night.

It's not clear to me that the compensation levels in the information systems entry-level jobs are commensurate with those that can be got in marketing or certain kinds of service management activities.

Do you think companies should be providing greater incentives for people to work in information systems?
My advice to the students who are interested in working in this field is: You don't want to work in a company where it's not a big deal. Go to a place where the expenditure levels as a percent of sales are large, where there is very significant value added coming out of these kinds of things.

Are there industries you recommend?
In financial services, it's a big deal in terms of new product development, new channels of distribution. In the wholesale industry, it can provide a big competitive advantage. In aerospace there are very complex [computer-aided design and engineering] efforts.

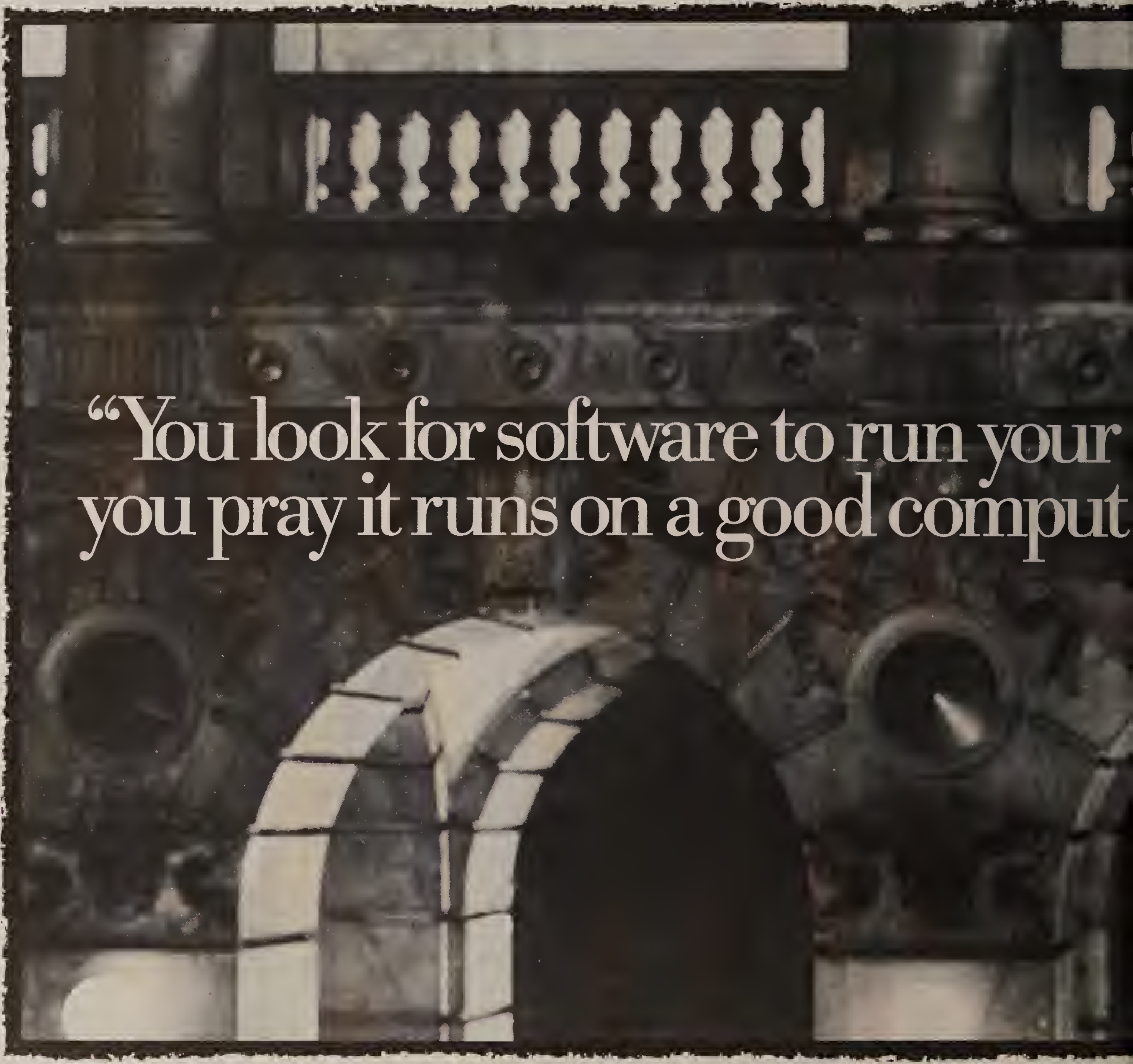
Look for places where it really is aligned against three or four things that the company has to do right to be successful. That's where the large salaries are, that's where the challenging problems are, that's where you can make a really big impact.

Do you think there'll be any changes in the prospects for IS managers to go on to top-level management?
In companies where it's a big deal. I'm a director of the Royal Trust Co. of Canada. Our chief operating officer has come out of the information systems function. He's a super high-energy person. He has total command of the technology but knows the rest of the business.

Do you think that is going to become more common in 10 years?
Yes, I think it's going to become more common because of the kinds of people who are going in and the diversity of the career path. If you want to be a general manager and you enter the information systems side, you may start as an analyst at a bank. You move on as a branch manager; you come back as manager of a large systems and programming group. You look for significant management jobs on each side as you move up in the firm

I emphasize the word "line jobs." People who help in dealing with real customers, real problems, feel real pressure. Someone who works as a staff member gets an entirely different view of what's going on than someone who is out on the sharp edge. The people who enter the information systems function who can head large project teams and then gain insight into what it really takes to be successful — those are the ones who have the careers.

Can you assess the state of IS education at colleges and universities around the country?
It varies all over the place. We're training people for very different roles. We've got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education for those who are going to be the doers — database architects, programmers and analysts. And then we've got education for those who are going to manage the departments that are going to be impacted. In general, the more specialized the technology, the better job we do of training people. It's easier to train people to do technical jobs than it is to think through the administrative environment within which the tasks are going to be executed.

So there's an adequate job being done in training in the technical areas?

I think the job is being done better in the technical areas than in the nontechnical. It has a lot to do with career paths — what does a typical MIS professor get trained in? He gets trained in research methodology. He gets trained in computer science. Does he get trained in all the nuances of applications development and how to make things happen in the real world? No.

Every year I go to the leading conference of information systems academics. They are different than the people I spend most of my life working with because they are *heavily* focused on the technology kind of education and they try to help people think about things in a very hands-on, how-to-make-it-happen way. They aren't very good at business policy or the broad view as to how an organization operates and how the technology can be grafted onto it.

CALENDAR

OCT. 7-13

User Groups and Associations: The Management Imperative. Chicago, Oct. 8-9 — Contact: Technovation, Toledo, Ohio (419) 537-1122.

Making CASE Work. Scottsdale, Ariz., Oct. 8-10 — Contact: CASE Research Corp., Bellevue, Wash. (206) 453-9900.

Human Factors Society Meeting. Orlando, Fla., Oct. 8-12 — Contact: Steve Marlin, HFS, Irvine, Calif. (714) 752-7866.

EDI Steps for Success. Atlanta, Oct. 9-10 — Contact: Inform, Alanta, Ga. (800) 343-5048.

CASE World. Chicago, Oct. 9-11 — Contact: Digital Consulting, Andover, Mass. (508) 470-3880.

Introduction to Reconfigurable Computer Architectures. Washington, D.C., Oct. 9-12 — Contact: George Washington University, School of Engineering and Applied Science, Washington, D.C. (202) 994-6106.

Data Administration in the 1990s. Washington, D.C., Oct. 10-12 — Contact: Performance Development Corp., Princeton, N.J. (609) 921-3770.

International ACM/SIGIR Conference on Information Retrieval. Chicago, Oct. 13-16 — Contact: Association for Computing Machinery, New York, N.Y. (212) 869-7440.

OCT. 14-20

Computer Services, Communications and Information Systems Seminar. Baltimore, Oct. 14-17 — Contact: Sarah Hess, Alex. Brown & Sons, Baltimore, Md. (301) 727-1700.

Educom '90. Atlanta, Oct. 14-17 — Contact: Educom, Princeton, N.J. (609) 520-3340.

International Users Group for Repository and AD/Cycle. Chicago, Oct. 14-17 — Contact: R/AD, Chicago, Ill. (312) 644-6610.

Retail Information Systems Conference and Exposition. St. Louis, Oct. 14-17 — Contact: NRF, New York, N.Y. (212) 244-8780.

Caller ID, Automatic Number Identification Technologies & Privacy. Washington, D.C., Oct. 15-16 — Contact: Telecommunications Reports, Conference Dept., Washington, D.C. (202) 347-2970.

Next Generation Telephone Conference. New York, Oct. 15-16 — Contact: Jupiter Communications, New York, N.Y. (212) 941-9252.

Data Entry Management Association Conference and Exposition. Las Vegas, Oct. 15-17 — Contact: DEMA, Norwalk, Conn. (800) 888-6485.

Buscon '90. Marlboro, Mass., Oct. 15-18 — Contact: Conference Management, Norwalk, Conn. (203) 852-0500.

IBM Token-Ring & SNA: Gateways, Bridges and Network Management. Washington, D.C., Oct. 17-19 — Contact: Kaptronix, Haworth, N.J. (201) 769-4250.

Mapping to X12 & Edifact EDI Standards. Chicago, Oct. 18-19 — Contact: EDI Group, Oak Park, Ill. (708) 848-0135.

CAD/CAM,CAE Reseller/VAR Strategy Workshops. Bedford, Mass., Oct. 20-21 — Contact: Silvia Bianchi, Daratech, Cambridge, Mass. (617) 354-2339.

OCT. 21-27

International Congress on Advances in Nonimpact Printing Technologies: Black & White and Color. Orlando, Fla., Oct. 21-26 — Contact: The Society for Imaging Science and Technology, Springfield, Va. (703) 642-9090.

Datapro Executive Symposium. New York, Oct. 22-23 — Contact: Datapro Symposium Office, Delran, N.J. (800) 328-2776.

International Conference on Desktop Manufacturing: The Rapid Prototyping Revolution. Cambridge, Mass., Oct. 22-23 — Contact: Conference Coordinator, CAD/CIM Management Roundtable, Boston, Mass. (617) 232-8080.

Knowledge-based Systems in Everyday Use: Increasing Productivity and Profits. San Diego, Oct. 22-23 — Contact: Donna Kacin, Decision Support Technology, Cambridge, Mass. (617) 354-6400.

The Western Canada DB2/SQL/DS Users Group Conference. Winnipeg, Man., Canada, Oct. 22-23 — Contact: Peter Barnett, Wescan Users Group Conference, Winnipeg, Man., Canada. (204) 946-6600.

Electronic Messaging '90. San Francisco, Oct. 22-24 — Contact: Electronic Mail Association, Arlington, Va. (703) 522-7111.

CIPS Edmonton '90, Information Technology Conference. Edmonton, Alta., Canada, Oct. 22-25 — Contact: Canadian Information Processing Society, Edmonton, Alta., Canada. (403) 488-1879.

Jerusalem Conference on Information Technology. Jerusalem, Oct. 22-25 — Contact: Tzell, Travel and Tours, New York, N.Y. (800) 288-7908.

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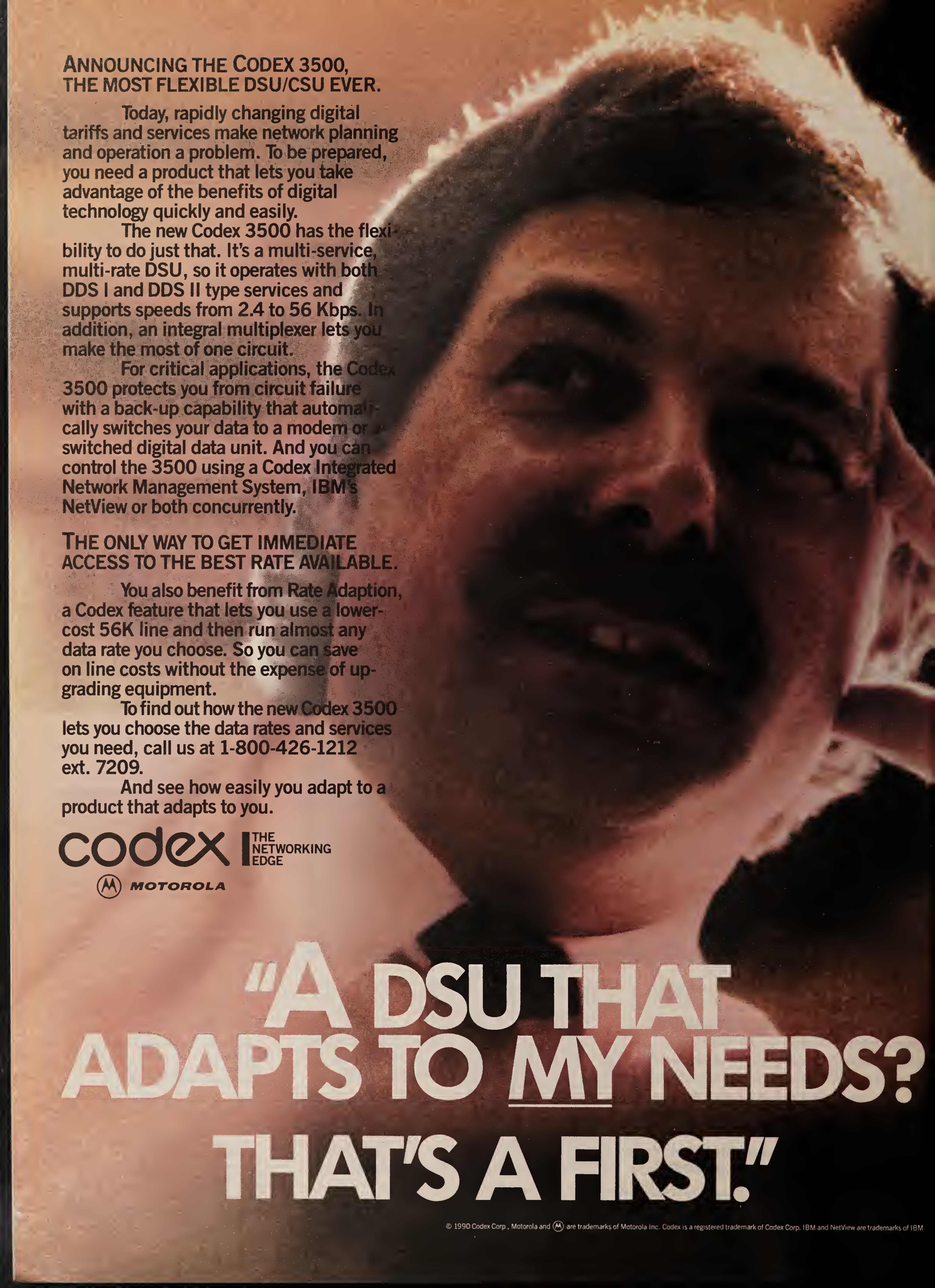
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PRODUCT SPOTLIGHT

MINICOMPUTERS:

For each buyer, a different perspective

BY ALAN RADDING

Before you purchase a minicomputer, you may first want to ask yourself what kind of minicomputer purchaser you are. According to Dudley Cooke, president of the Executive Insight Group, a systems consulting firm, there are at least five types of buyers and knowing where you and your firm fall within those categories at the time of selection can make a large difference in fit and effectiveness.

Cooke's categories of minicomputer purchasers include the following:

- Small firms, where the minicomputer is the only system.
- Departments of large firms that use a single minicomputer as a general departmental processor, forming one component of a distributed processing architecture.
- Companies that use the machine as a specialized processor for a particular application — another example of distributed processing.
- Firms involved in downsizing applications from a mainframe to a minicomputer setup using one or more minicomputers in conjunction with personal computer local-area networks.
- Organizations that use the minicomputer as a large, powerful, specialized server on a LAN.

Among the various scenarios, the actual evaluation process doesn't drastically change. Most minicomputer buyers tend to start with the application and focus only on the platforms that offer the best software packages and strongest support. They then assess their communications and compatibility requirements to ensure that the minicomputer will work effectively within the organization's overall systems framework.

What changes is the way the various purchasers need to weigh buying issues, sorting out which functionality should be emphasized and what can be downplayed.

"A general-purpose mini doesn't have to be architected differently for roles like LAN serving. But it has to be tuned a little differently," says Jim Hammons, vice-president at The Sierra Group, Inc. in Tempe, Ariz. For instance, a minicomputer used as a server should have a large amount of available cache, up to 256K bytes. An on-line transaction processing machine should offer a sufficient number of asynchronous ports.

"There will be a lot of customization of the general-purpose mini" to support the various roles, says David Card, director of systems research for mainframe and multiuser systems at International Data Corp. in Framingham, Mass.

Robert de Michiell

In the small company for which the minicomputer is the only system, the machine runs a full suite of applications, including general accounting and financial jobs, office automation and specialized, industry-specific applications. The system can be as small as an IBM System/36 or entry-level Application System/400 and as large as a Data General Corp. MV/40000 or Digital Equipment Corp. VAX 6000.

From a functionality standpoint, the system needs to be designed along the lines of a mainframe with ample I/O capability, storage, bandwidth and processing power to accommodate multiple users and concurrent tasks. It also needs to have strong database management features.

On the other hand, high performance plays a distant second to reliability and overall functionality. "Ease of administration is the main consideration in this purchase decision, followed by software availability," says Thomas Nolle, president of CIMI Corp. in Vorhees, N.J. Managing the system in a small shop should not require a large technical staff, he adds.

Upgradability is another plus. "A key factor in the choice of a mini for a small company is the growth path," adds Bob Walsh, vice-president at the Boston Systems Group. "Small companies are usually growing companies, and they need a system they can grow with." Walsh recommends that the buyer look for a clear upgrade path on the minicomputer or generous expansion facilities.

The group that uses the minicomputer as a general departmental processor needs a machine that will serve the same variety of needs as the small company, from administrative functions to production.

In this case, the minicomputer must offer sophisticated communications capabilities to share data and support services with headquarters and other departmental minicomputers on the corporatewide network.

"The big issues for a department are communications and compatibility from a support standpoint," Walsh says.

Buyers in this group should avoid systems that cannot accommodate a variety of communications protocols. "The most important thing here is connectivity back to the data center. The lesson of the late 1980s is that we can't tolerate isolated pockets of computing," Nolle adds.

For the minicomputer buyer who needs a specialized processor, the application is the important factor. Hardware is selected on the basis of its ability to handle a specialized application. For instance, if the application is highly math-intensive — such as engineering or graphics — the system must be optimized for processing performance. If the system is intended for on-line customer service, the operating system needs to use English-language prompts.

While the common approach

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INSIDE

Alternate Route
Servers are ousting low-end minis in some cases.
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Buyers' Scorecard
Hewlett-Packard comes out on top in user ratings.
Page 80.

Recent Releases
A guide to minis shipped in 1988 through 1990.
Page 83.

Radding is a free-lance writer in Newton, Mass.

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is to buy a general-purpose machine and add applications as needed, most analysts suggest that this group of purchasers buy separate minicomputers for different applications. One reason is that each application requires a different hardware configuration to perform optimally. Secondly, says Ron Cipolla, president of Kentech in Mansfield, Mass., prices on these machines have dropped, especially the smaller models, making the multiple-machine approach a cost-effective one.

"Why risk potential resource conflicts?" he asks. "Just add another machine. Each machine can be small, and the cost of the additional machine may be less than an upgrade."

Similar applications can be grouped to run on one machine. A user may run order entry and distribution on one minicomputer and purchase a separate one for manufacturing resource planning.

Companies involved in moving applications from the mainframe to a minicomputer in a LAN or wide-area network configuration will also buy more than one machine, according to Cooke. As in a departmental setup, communications capability is an all-important issue to support cooperative processing.

"This user is probably talking about client/server relationships," Nolle says. In that case, the machine needs to support a variety of communications protocols, such as those for OS/2, DOS and Unix. The mini should also provide high-performance processing and intensive I/O capabilities to handle frequent requests to the database.

Client/server functionality is also important to the fifth group of purchasers, which uses minicomputers as powerful, specialized servers on a LAN. Functions that users need to watch for are large-capacity storage, fast processing, multiple access paths, high-speed throughput, a variety of protocol support and ports for various devices.

Nolle adds two emerging uses for minicomputers: a gateway device on a network and a dedicated system management machine. In the first case, the key requirement is that the mini supports a large number of protocols and a variety of high-performance communications lines, such as T1.

As a dedicated system manager, the mini handles both network management and system administration for large distributed systems. "The key to network management is fault tolerance," Nolle says. If the network manager goes down, the system is running blind.

Minicomputers offer various levels of fault tolerance. Any machine can achieve it through disk-mirroring; however, both Tandem Computers, Inc. and Stratus Computer, Inc. specialize in fault-tolerant offerings, and DEC is now working on a full-fledged fault-tolerant machine.

No matter what type of buyer you are, price will come into play somewhere in your purchasing decision. However, where you go for budget approval is dependent on how you intend to use the machine.

When the minicomputer is the corporate processor or when a company is

Continued on page 78

Changeling

"I know one when I see one."

If you ask people how they define a minicomputer, that's what you're likely to hear. The definition used to be based on the type or number of processors, architecture or operating system, but "there is no technical definition anymore," says Michael Packer, vice-president of the information technology group at The MAC Group in Cambridge, Mass.

"Take a machine based on a single RISC processor and running Unix: Is that a minicomputer or is it a micro?" asks Brian Jeffery, managing director of International Technology Group in Los Altos, Calif.

Some consultants draw the line at how multiple users are handled on each platform. Minis are designed for multiuser service, while PCs and workstations are standalone machines adopted for multiuser purposes in a LAN server environment.

Others say applications separate minicomputers from PCs. "You don't do manufacturing, distribution, transaction processing or even accounting with a PC LAN," says David Card, director of systems research at International Data Corp. in Framingham, Mass.

Maybe the historical approach is best, suggests Wayne Kernochan, senior analyst for distributed systems at The Yankee Group in Boston: "Minicomputers are what minicomputer vendors sell."

In this case, the term minicomputer covers machines that range in price from $15,000 to more than $750,000, which makes it that much more important to know what you need before you go out and buy.

ALAN RADDING

Choose the environment that matches your needs

BY ALAN RADDING

When choosing a software environment, users have two choices: proprietary and open or Unix. The best decision depends on what type of buyer you are.

Proprietary systems — including Digital Equipment Corp.'s VAX/VMS, Wang Laboratories, Inc.'s VS and IBM's OS/400 — are both the great strength and the Achilles' heel of minicomputers.

Proprietary systems are all robust, industrial-strength environments for multiuser distributed systems. Buyers intending to use minicomputers for traditional uses tend to prefer these proprietary systems because the vendors offer large libraries of applications software, relative ease of operation, simplified system management and close vendor support.

On the other hand, the proprietary systems lock users into a single platform, a situation that makes connectivity a difficult accomplishment.

For buyers who need to fit the minicomputer into a multivendor, client/server environment, Unix's portability, ease of connectivity and better price/performance outweighs the advantages of proprietary systems.

For these buyers, ease of use is less of an issue. End users in a client/server setup interface with client machines, not directly with the minicomputer in its server role. In addition, these buyers may not count on effective vendor support because they are building their own client/server systems with components from multiple vendors.

With more vendors porting applications to Unix, the open environment might even start to appeal to more traditional users. In addition, new releases of the operating system provide more of the features that users typically see in their proprietary systems.

Some experts go so far as to say that proprietary systems will eventually be superseded by Unix. "The big question is, 'Why use a [proprietary] mini?' " says Brian Jeffery, managing director of the International Technology Group in Los Altos, Calif.

"If I wrote an application for a proprietary system, the next thing I would do would be to port it to Unix," says Judith Hurwitz, vice-president at Boston-based Patricia Seybold's Office Computing Group.

Minicomputer vendors themselves acknowledge the importance of Unix by providing Unix-based products along with their proprietary lines. DEC offers Ultrix and its Decsystem, while Data General Corp. provides Aviion.

Here for the duration

Proprietary systems still beat Unix in providing a robust multiuser environment, however, and they are also stronger in terms of performance. "The proprietary systems aren't going away because they offer added value. Hewlett-Packard gets higher throughput with its proprietary operating system than with Unix," acording to Jim Hammons, vice-president at The Sierra Group, Inc. located in Tempe, Ariz.

Hammons and other analysts argue that proprietary systems are here for a long time to come and that the large installed base of proprietary system users — wedded to their proprietary applications — are not going to disappear overnight.

> "THE BIG QUESTION is, 'Why use a [proprietary] mini?' "
>
> BRIAN JEFFERY
> INTERNATIONAL TECHNOLOGY GROUP

What might actually happen is that proprietary system users will want their open Unix system and their applications, too. At Knoxville Community Development Corp. (KCDC) in Knoxville, Tenn., DG's Nova minicomputer served the company well for nine years, running specialized housing authority software.

When the agency needed to upgrade to a larger, more powerful minicomputer two years ago, the agency's managers decided to leave behind the world of proprietary minicomputer software and opt for Unix. They insisted, however, on bringing its specialized housing authority applications with it.

"A key part of our request for proposals was that the vendor convert our present software to Unix," says Helen Branson, program coordinator of data processing at KCDC. The agency needed to stay in step with other government agencies that had converted to Unix, particularly the federal Department of Housing and Urban Development.

"We had so much time and money wrapped up in the existing software, and we had customized it to our needs," Branson says. "We weren't about to start reinventing the wheel." •

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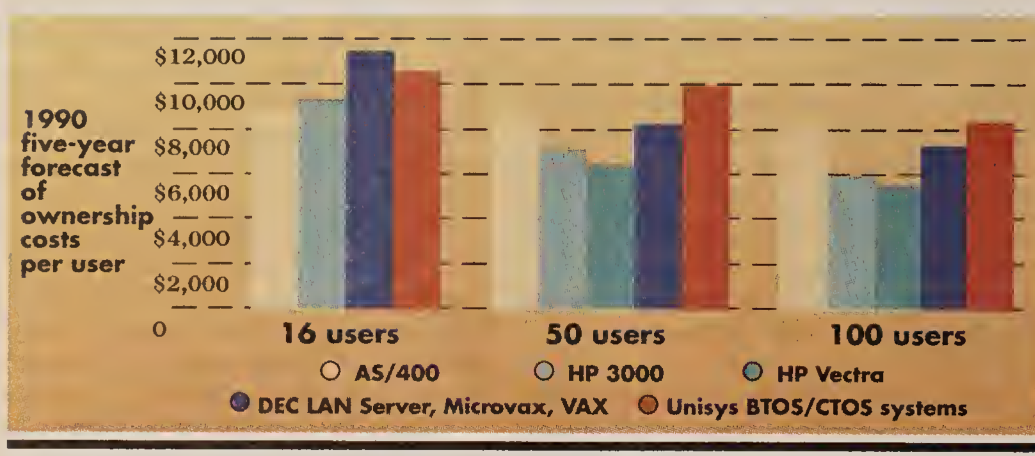
The more the merrier

As the number of users increases from 16 to 100, DEC five-year costs drop four times as much as IBM's; HP's drop three times as much as IBM's; and Unisys' two times



Source: The Sierra Group, Inc.

CW Chart: Chuck Fletcher

Continued from page 76

downsizing, the purchase decision is made at the corporate level, and the money comes from the corporate budget, Nolle says. When the minicomputer is intended as a departmental machine, an application processor or a specialized server, the purchase decision and budgeting is usually at the departmental level. In general, departments prefer to lease their minicomputers, Nolle says.

While price is certainly an issue in the minicomputer evaluation, price/performance itself is less a priority than software and hardware support and service.

"There is more to price than the cost of the CPU," says David Andrews, president of Cheshire, Conn.-based ADM, Inc., a consulting firm specializing in the IBM midrange. Particularly in the first three groups, users are willing to pay more for an environment that offers packaged solutions, a strong service and support network and ease of use.

As is happening elsewhere in the computer industry, however, minicomputer prices are dropping. One factor that has influenced the decrease is competition with Unix workstations. As vendors show more flexibility in pricing, users have more leveraging power, Walsh says.

Once you've paid for your minicomputer and the box finally arrives, don't be alarmed if someone tells you that the minicomputer is dead. Just tell him it is a big workstation or — better yet — a small mainframe. In today's market, a minicomputer can pass as almost any multiuser machine, with something for almost every type of user. ●

Lease factors

When the computer industry is slow, so is the computer leasing industry. But on top of the general industry slowdown, minicomputer lessees and lessors are also coping with the changes wrought by rapid technological development.

"It seems to me that the vendors are cannibalizing themselves. They bring out products so rapidly that they are pushing down the price/performance curve faster than they need to," says Tony Jeffcott, senior manager at Deloitte and Touche National Leasing Services in Edison, N.J.

This trend also seriously undercuts residual value, which is the worth of the machine when the lease terminates. For lessors, that lower value means they could lose their shirts on leases, getting stuck with products that suddenly have far less value than expected.

For lessees, the drop in value means lease costs are higher, and lease terms are shorter.

However, buyers can control residual value to some degree by choosing carefully among vendors.

DEC equipment has a strong secondary market that serves to support residual values. But the firm introduces new products with such frequency that it can also undercut residual value, says Sonny Monosson, chairman of the American Computer Group, Inc. in Boston.

The fact that Wang is not introducing much in the way of new products has a stabilizing effect on residual value, says Allan Newman, chairman of The Newman Group in Dexter, Mich.

Other vendors' minicomputers lose residual value because of the vendor's policies, such as refusal to honor a license transfer.

On the other hand, says Tom Martin, president of Computer Financial Leasing in Hackensack, N.J., "IBM holds superior market value," because the company provides extensive after-market support, and there is a large market in used IBM equipment.

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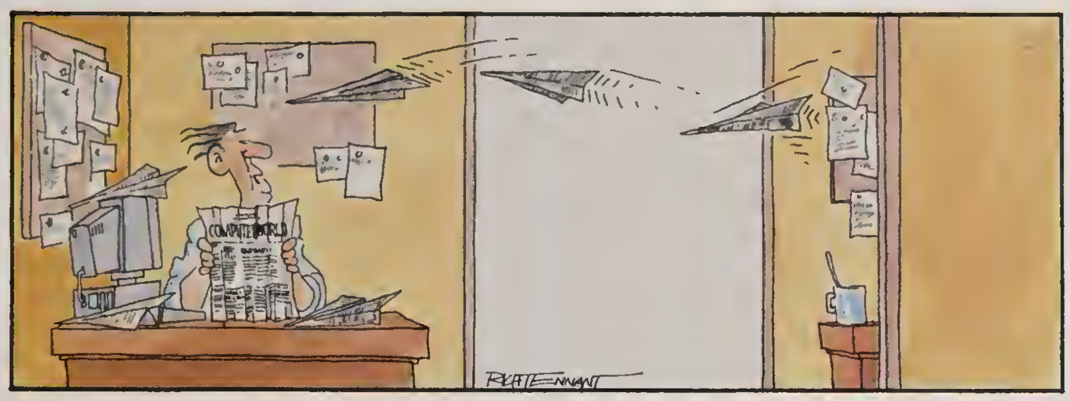

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   - E. Local Area Networks
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   - **50.** Business Service (except DP)
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   - **65.** Communications Systems/Public Utilities/Transportation
   - **70.** Mining/Construction/Petroleum/Refining/Agric.
   - **80.** Manufacturer of Computers, Computer-Related Systems or Peripherals
   - **85.** System Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
   - **90.** Computer/Peripheral Dealer/Distr./Retailer
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Servers make their move on minicomputers

BY CHUCK BARNEY

An emerging class of machines is trying to prove to low-end minicomputer buyers that you don't need a spoon to stir your coffee. These machines — based on personal computer technology and configured with database management capabilities, on-line transaction processing (OLTP) and some level of fault tolerance — are making a strong move into a role where low-end minicomputers once stood strong: file serving.

According to Workgroup Technologies, Inc., these "server" machines from AT&T, Netframe, Inc., Concurrent Computer Corp. and Compaq Computer Corp. are showing a compound annual growth rate of more than 40% per year through 1993, while minicomputer placements will experience a compound annual decline of 4% per year during that same time period.

While there is no better machine than a minicomputer for some buyers, recent enhancements on servers enable them to do minicomputer-like jobs at a lower price — about $15,000 to $20,000 for an entry-level configuration.

One enhancement is processing power. Server-class PCs and workstations based on the Intel Corp. 80386 or I486 chip deliver 40 million instructions per second (MIPS) of speed, compared with five to 60 MIPS on low-end minis.

Compaq's Systempro and AT&T's Starserver are configured with more I/O buffering, faster memory access and 32-bit buses to achieve a balanced architecture targeted at the server environment.

Servers have also become stronger in fault tolerance. On Concurrent's Server, users have the option of purchasing adjustable levels of fault tolerance. An operator may decide to enable disk-mirroring or even install redundant drive controllers and processors where higher levels of fault tolerance are required.

While network management is still a weakness for this class of machine, Netframe is addressing this limitation by including a suite of network management tools on its multiprocessing machine that support hundreds of active PC users.

Minicomputers have a clear upper hand, however, in offering network management capability. They also offer better data security, more disk storage and the ability to interact with other minicomputer- and mainframe-based applications. Environments that require a high level of data security and integrity will continue to use minicomputers as file servers. •

Barney is director of the competitive analysis service at Workgroup Technologies, Inc. in Hampton, N.H.

ASK THE VENDOR

We use a protocol converter to upload data from a CT 400 minicomputer to an off-site IBM mainframe. The CT 400 is also connected to an on-site Digital Equipment Corp. VAX 6210. How can I pass data from the CT 400 to the VAX and then to the IBM while my converter is being repaired?

John Couch
Highway Technical Supervisor
Wyoming Highway Department
Cheyenne, Wyo.

COMPUTER TALK, INC.: We can use the CT 400's internal modem to send you a patch program with which you can transmit the IBM file to the VAX machine. We can also do any debugging over the phone.

The estimated transmission time is four hours, and the cost is $1 per minute.

We use the DEC VAX 11/780 bundled with Intergraph's Interactive Graphics Design software for many of our shop's mapping applications.

We're currently moving from a minicomputer environment to networked microcomputers and file servers. What role will Intergraph play among companies making this type of transition?

Bob Long
Information Systems Project Manager
Department of Information Resources
City of San Antonio
San Antonio

INTERGRAPH CORP.: We provide the means for you to move graphics files from the minicomputer to the workstation without having to change them.

For migrating databases, we provide software and support for translating data from a hierarchical database structure to one of many commercial relational databases that Intergraph supports.

Also, we sell a full complement of Unix workstation- and server-based applications in our Modular GIS Environment that are designed to work within a distributed network of workstations and servers.

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BUYERS' SCORECARD

Hewlett-Packard cleans up in mini sweepstakes

BY MICHAEL L. SULLIVAN-TRAINOR
CW STAFF

What's your favorite ice cream?

While many people would say strawberry is good and chocolate is fine, Heath Bar Crunch stands out as unique in its mix of ingredients.

Buyers' satisfaction with their chosen minicomputers is much the same. IBM and Digital Equipment Corp. can do the job, but Hewlett-Packard Co. has a different way of implementing capabilities that capture the fancy of many information systems managers.

Fifty users of the HP 3000 Model 925 found many ways to make their satisfaction with the product clear in this Buyers' Scorecard on minicomputers. The system captured the highest rating in 13 of 15 categories, outscoring IBM's Application System/400, DEC's VAX and AT&T's 3B2 by a full five points.

The ratings are based on survey results from 50 users of each product. Total scores are derived by multiplying the ratings each user group gave its own product by the importance factors all users assigned to the criteria.

While HP garnered its highest ratings in the categories of availability, future growth and compatibility, users also gave it very high marks in programming capability and interfacing with other vendors' systems.

"It runs like a giant PC," says Thomas Arnoldo, information services administrator at Mercy Hospital in Portland, Maine.

The system's programmability is largely the result of integration between third-party software and the HP 3000's system functions. The system also topped the category of availability of third-party applications (8.1), followed closely by IBM's AS/400 (8.0). Respondents also rated HP's system higher (8.7) than the other models on ease of computer operation.

IBM and DEC tied for second in the overall ratings despite DEC's first-place finishes in the performance and effective networking support categories. IBM came in third in all but one of the key ratings of most importance to users, but the AS/400 produced the second highest marks in seven of the remaining nine categories.

IBM placed last in compatibility with installed hardware and software — a tenth of a point behind AT&T. The AS/400 also tied with the 3B2 for last in effective networking support.

DEC was rated the lowest in price/performance categories, ringing up scores of 6.9 or less in the three criteria. HP set the pace in these areas, with scores of 7.7 or higher.

The only Unix system in the rating, AT&T's 3B2, scored last in 10 out of the 15 factors measured. The system's highest scores were in availability, compatibility and storage capacity. Its third-place ratings included efficient I/O performance, overall cost of ownership, acquisition and maintenance cost and cost per million of instructions per second.

Users rated availability and ability for future growth as most important. Third-party software and distributed processing had the lowest ratings. •

COMPUTERWORLD BUYERS' SCORECARD

Minicomputers

Total scores reflect all criteria and their user-assigned importance
Response base: 50 users per product

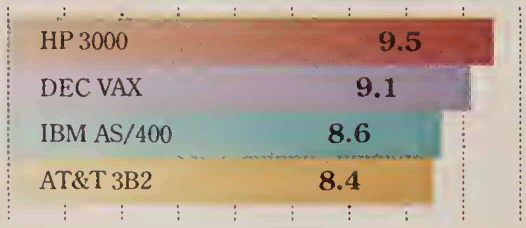
Product	Three highest ratings	Three lowest ratings
Hewlett-Packard Co.'s HP 3000 Model 925 SCORE 71	Availability Ability to provide future growth Compatibility with installed hardware	Networking support Acquisition & maintenance cost Support for distributed processing
IBM's AS/400 Model 60 SCORE 66	Ability to provide future growth Availability Quality of service & technical support	Support for distributed processing Acquisition & maintenance cost Cost per MIPS
Digital Equipment Corp.'s VAX 6000 Model 210 SCORE 66	Availability Overall performance Ability to provide future growth	Acquisition & maintenance cost Overall cost of ownership Cost per MIPS
AT&T's 3B2 Model 600 SCORE 62	Availability Compatibility with installed hardware Sufficient storage capacity	Availability of third-party applications Support for distributed processing Cost per MIPS

KEY RATINGS

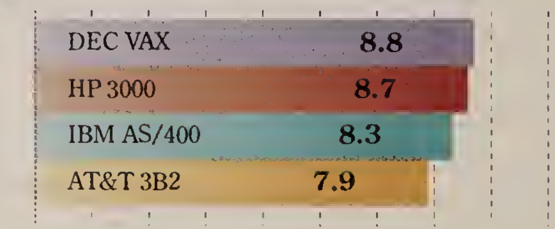
HP tops five of six key factors by strong margins, garnering ratings of nine or close to nine out of 10 in each category. DEC edges ahead in overall performance and takes second in five other categories of high importance to users

User importance rating:

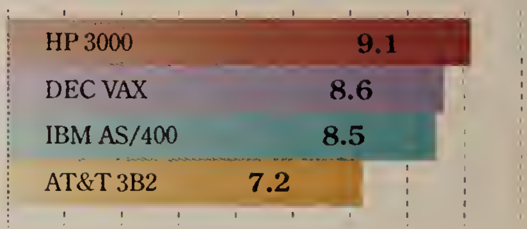
9.2 Availability



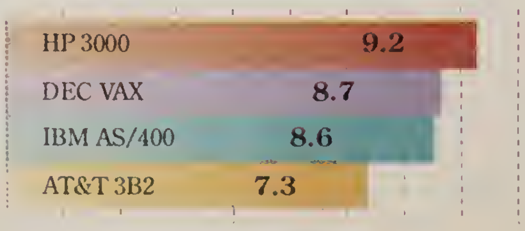
8.8 Overall performance



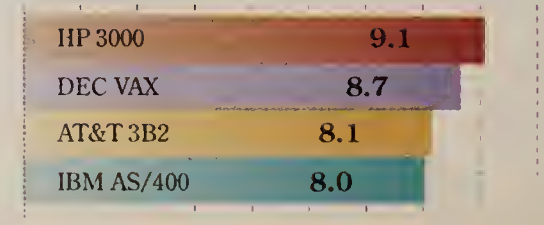
8.8 Quality of service & technical support



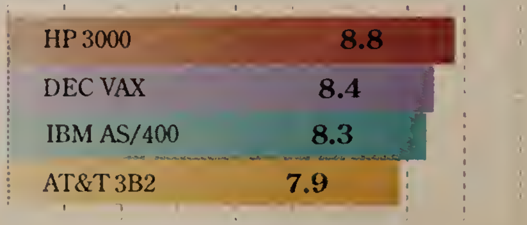
8.8 Ability to provide future growth



8.7 Compatibility with other installed hardware



8.6 Sufficient storage capacity

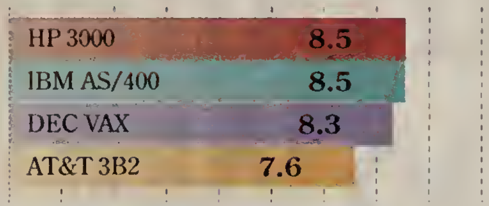


A CLOSER LOOK

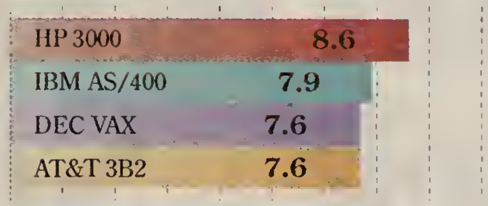
IBM's AS/400 takes second in seven out of nine remaining categories, scoring high in memory but low in networking and distributed processing support. AT&T's 3B2, which placed fourth in most categories, captured third in five areas

User importance rating:

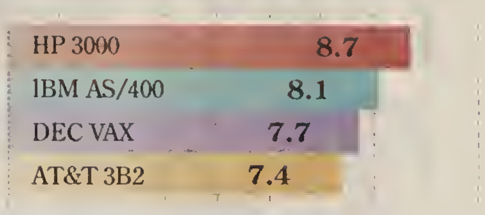
8.3 Sufficient memory



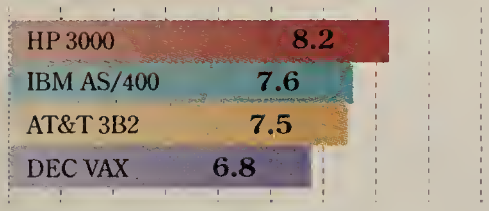
8.3 Efficient I/O performance



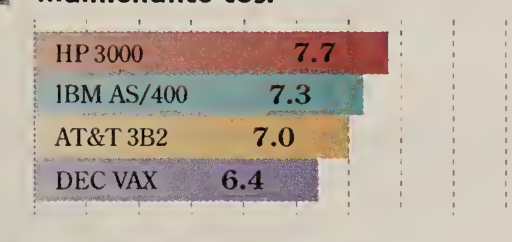
8.1 Ease of computer operation



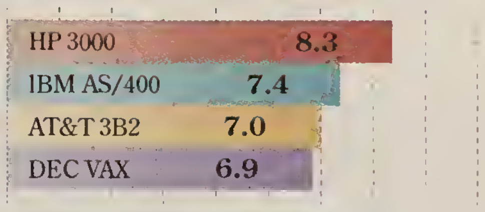
8.1 Overall cost of ownership



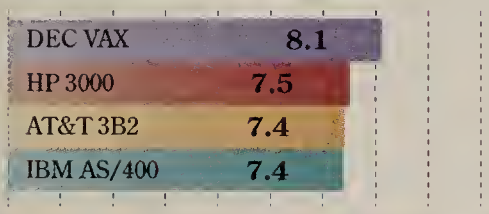
8.1 Reasonable acquisition & maintenance cost



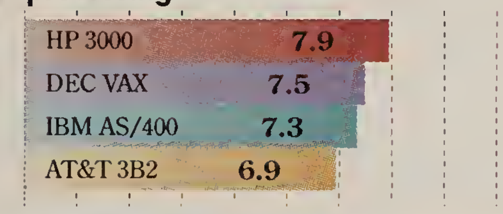
7.9 Reasonable cost per processing cycle (MIPS)



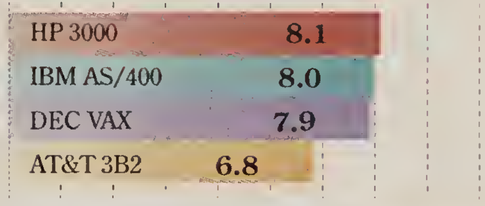
7.7 Effective networking support



7.4 Effective support for distributed processing



7.4 Availability of third-party applications



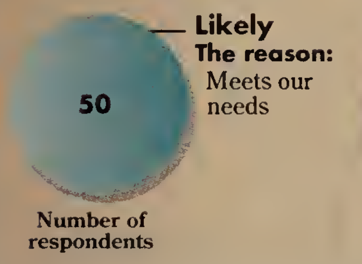
Loyalties

Would you buy the product again?

(Reasons based on most frequently stated responses)

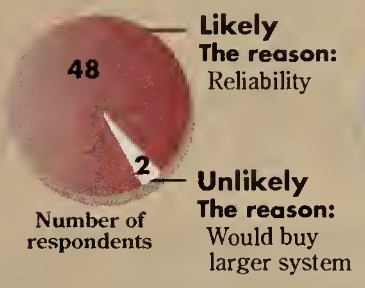
IBM AS/400

Response base: 50



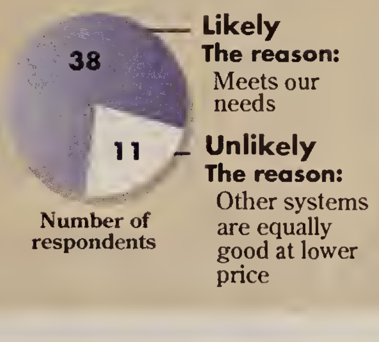
HP 3000

Response base: 50



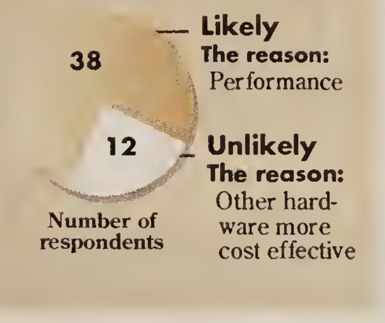
DEC VAX

Response base: 49



AT&T 3B2

Response base: 50



"Verbatim"

What do you like best/least about this product?

(Responses are based on the most frequently stated answer)

	IBM AS/400	HP 3000	DEC VAX	AT&T 3B2
Likes	Ease of use Performance Database capabilities	Reliability Ease of use Support/service/maintenance	Ease of use Expandability/upgradability Reliability	Reliability Unix-based system Service/support
Dislikes	Compatibility with non-IBM products Disk drive mechanical problems Support from IBM	Lack of applications software Difficult operating system Incompatible with other hardware	Cost of hardware and software A lot proprietary to DEC Maintenance costs	Slow Service/support/maintenance Lack of applications

Vital statistics

(Response base of 200; multiple responses allowed)

Who responded:

Manager	103
Director	51
Staff	35
Other	11

Their responsibility for minicomputers:

Evaluate or recommend vendors	173
Determine need	164
Set standards for the organization	160
Select vendors	151

Time involved with minicomputers:

Five or more years	155
Three to four years	23
One to two years	17
Less than one year	3

CW Charts: Paul Mock

METHODOLOGY

Products rated in *Computerworld*'s Buyers' Scorecard on Minicomputers were selected in the following manner: The products had to be from one of the top vendors in the proprietary or Unix segments of the minicomputer market in terms of installed base and revenue. Within that sample, they also had to be the largest capacity systems that were comparable in terms of size and features.

The sample included the top three vendors in the proprietary segment — IBM, DEC and HP — and the top three vendors in the Unix segment. However, because HP and DEC were already included on the proprietary side, only AT&T was included from the Unix group.

The survey was conducted by telephone interviewers from First Market Research in Austin, Texas, using names selected randomly from nonvendor sources. A minimum of 50 users was required for each product.

Total weighted scores were computed by multiplying the mean scores all users assigned to the importance of each criterion by the mean scores each user group gave to its own product.

RESPONDENT PROFILE

Most respondents (51%) have been using these minicomputer products for two to three years. Thirty-nine percent have worked with them for one year or less and 10.5% for more than four years.

Fifty-eight percent of the respondents use their minicomputers for accounting and billing applications, and 35% use them for order processing and inventory functions. Median company size for the group was $208 million in annual revenue. Thirty-one percent of the companies are in manufacturing; 12% in government; 10% in insurance; and the balance came from a mix of banking, financial services and consumer products and health care companies.

ACKNOWLEDGMENTS

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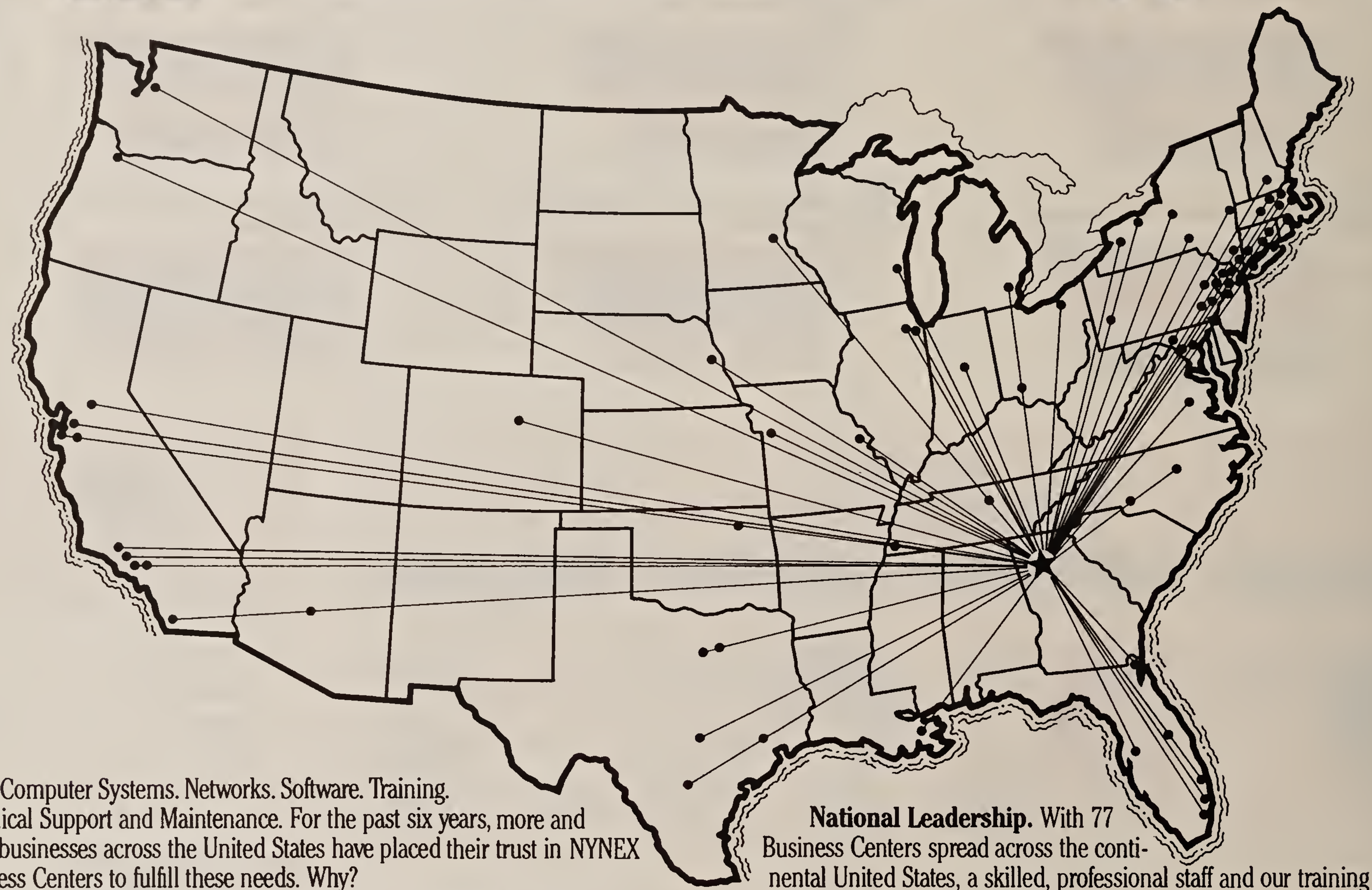

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Late-model minicomputers*

VENDOR	PRODUCT	PRIMARY MARKETS[1]	COMPARABLE SYSTEMS	MAXIMUM NUMBER OF CPUs	PERFORMANCE (MIPS)[2]	PERFORMANCE (MFLOPS)[3]	BENCHMARKS[4]	MACHINE CYCLE TIME	MEMORY RANGE/ MAXIMUM CACHE (BYTE)	DISK CAPACITY (BYTE)	DISK TRANSFER RATE (MBYTE/SEC.)	MAXIMUM NUMBER PORTS/ MAXIMUM NUMBER CHANNELS	CHANNEL SPEED (MBYTE/SEC.)	SUPPORTS PARALLEL PROCESSING OR FAULT TOLERANCE	OPERATING SYSTEMS SUPPORTED	NETWORK ARCHITECTURE SUPPORTED	DISTRIBUTION CHANNEL	BASE PRICE
AT&T **(800) 247-1212**	3B2/1000, Models 70, 80, 522, 600	DP, OLTP, SE	NCR Tower 32 Model 825	4	5 - 16	NP	4.6 DS (actual)	NP	4M - 64M/8K	150M - 14.4G	4	338/NP	NP	Neither	Unix System V	SNA	VAR, Direct	$19,900 - $74,900 with Model 80 Package B consisting of 32M-byte memory, 2 CPUs, 320M-byte or 525M-byte cartridge tape drive, power supply, 1.2G-byte disk capacity
	System 7000, Models 7020, 7040, 7080, 7080R2	OLTP, DP, SE	HP 9000 Series 800, DEC VAX 6000 and 5800 series, IBM RS/6000	12	14 - 168	NP	16.7 DS; 200+ DC trans/sec. (actual)	100 nsec; RISC-based processor	16M - 512M/1M	15M - 85G	NP	512/NP	NP	Neither	Unix System V, BSD	SNA	VAR, Direct	$88,000 - $1,750,000 with minimum 32M-byte memory, 1 CPU
	Starserver FT	OLTP, DP	Stratus XA2000 Models 210 - 260, Sequoia Series 200 and 300	3	11 - 15.6	NP	NP	60 nsec; RISC-based processor	16M - 40M/1M	600M - 17G	1.2	128/2	10	Fault tolerance	Unix System V	SNA	Direct	$172,000+ with minimum 16M-byte memory, 4 CPUs, tape drive, duplexed power supply, 600M-byte disk capacity
Arix Computer Corp. **(408) 432-1200**	System 90, Models 25, 45, 85	DP, OLTP	Sequent Symmetry, Pyramid	8	15 - 300	5.6	NP	50 nsec	8M - 416M/ 0.5M	380M - 446G	4	1.024/32	NP	Parallel processing	Unix System V.3	SNA, NFS, RFS	OEM, VAR, Direct	$52,000 - $1,000,000+ with minimum 8M-byte memory, 1 CPU, 150M-byte cartridge tape drive, power supply, 380M-byte disk capacity
Bull H.N. Information Systems, Inc. **(508) 294-6000**	DPS 6000, 600 family	DP, OLTP, SE	IBM AS/400, DEC VAX 6000	5	3 - 10	NP	11.6 - 32.6 DC trans/sec. (actual)	140 nsec	6M - 64M/ 768K	295M - 11.9G	1.8	300/2	13.3 or 40	Parallel processing	GCOS 6 HVS, Unix System V.3.1	SNA, OSI, DSA	OEM, VAR, Direct	$90,000 - $500,000 with minimum 16M-byte memory, 1 CPU, 1 channel, power supply
	DPS 6000, 200 family	DP, OLTP, SE	IBM AS/400, DEC VAX 6000	2	0.7 - 1.7	NP	5.0 - 7.5 DC trans/sec. (actual)	200 nsec	2M - 32M/8K	68M - 3G	1.8	40/1	6.6	Parallel processing	GCOS 6 HVS	SNA, OSI, DSA	OEM, VAR, Direct	$14,000 - $80,000 with minimum 2M-byte memory, 1 CPU, 1 channel, power supply, 68M-byte disk capacity
	DPS 6000, 400 family	DP, OLTP, SE	IBM AS/400, DEC VAX 6000	5	1.7 - 3.6	NP	6.5 - 10.3 DC trans/sec. (actual)	200 nsec	8M - 64M/64K	142M - 9.5G	1.8	160/1	13.3	Parallel processing	GCOS 6 HVS, Unix System V.3.1	SNA, OSI, DSA	OEM, VAR, Direct	$33,000 - $250,000 with minimum 8M-byte memory, 2 CPUs, 1 channel, power supply
Concurrent Computer Corp. **(201) 758-7000**	Series 3200, Micro 3, Micro 5, 3280E	Real-time computing, SE, OLTP, DP	DEC VAX 6000, Microvax 3800, 3900; Encore 32/2000	12	0.5 - 72	1.3	3.9 - 6.8 single processor whetstones (actual)	100 nsec	8M - 256M/ 32K	1.2G - 2,000G	1.3 - 3	1,024/96	5.5 - 120	Parallel processing	OS/32 proprietary	SNA, Decnet, NFS, TCP/IP	OEM, VAR, Direct	$55,000 - $360,000 with minimum 8M-byte memory, 1 CPU, terminal, power supply
Control Data Corp. **(612) 853-8182**	4680	Database management processing, SE	DEC 5800, Pyramid	1	68	24 (peak)	120,000 DS Version 1.1; 11.3 LP MFLOPS; 42.6 Specmarks (actual)	16.7 nsec	32M - 256M/ 592K	1G - 800G	1.5 - 2 for SMD; 2 - 10 for disk array	144/6	30	Neither	EP/IX	SNA, Decnet, Cdcnet, TCP/IP	Direct	$145,000 - $500,000 with minimum 32M-byte memory, 1 CPU, channel, QIC-120 tape drive, power supply, 1G-byte disk capacity
	4360	Same as above	NP	1	27	10 (peak)	47,400 DS Version 1.1; 4.1 LP MFLOPS; 18.3 Specmarks (actual)	40 nsec	16M - 128M/ 128K	338M - 146G	1.5 for SCSI; 2 - 10 for disk array	18/6	3 - 20	Neither	EP/IX	SNA, Decnet, Cdcnet, TCP/IP	Direct	$47,050 - $200,000 with minimum 16M-byte memory, 1 CPU, channel, QIC-120 tape drive, power supply, 338M-byte disk capacity
	4330	Same as above	NP	1	25	10 (peak)	43,000 DS Version 1.1; 3.6 LP MFLOPS; 17.8 Specmarks (actual)	40 nsec	8M - 128M/ 64K	400M - 6.2G	1.5	18/1	5	Neither	EP/IX	SNA, Decnet, Cdcnet, TCP/IP	Direct	$11,720 - $75,000 with minimum 8M-byte memory, 1 CPU, SCSI channel, power supply, 400M-byte disk capacity
	Cyber 920B, 920C	SE	SGI 4D2XXS, 4D3XXS	8	16 - 234	1.6 - 34.3 double precision	16 - 234 DS Version 1.1	20 - 33 MHz	8M - 256M/ 384M	200M - 35.2G	2.1 for SCSI; 6 for IPI	56/4	24	Parallel processing	IRIX	SNA, Decnet, TCP/IP	Direct	$5,900 - $202,500 with minimum 8M-byte memory, 1 CPU, power supply
Data General Corp. **(508) 366-8911**	Eclipse MV/40000HA	DP, OLTP, OA, SE	DEC VAX 6000, 9000	4	14 - 54	NP	33 - 102 DC trans/sec. (estimate)	50 nsec	64M - 256M/ 64K	322M - 1,152G	2.6	4,224/7	53	Neither	AOS/VS II	Xodiac, TCP/IP, OSI	OEM, VAR, Direct	$629,000 - $1,585,000 with minimum 64M-byte memory, 1 CPU, channel, 2 power supplies
Digital Equipment Corp. **(800) 344-4825**	VAX 4000 Model 300	DP, OLTP, SE	HP 3000 Models 922, 932, IBM AS/400 Models 70, 45	1	8.0 VUPs[5]	NP	22 TPC/A trans/sec.; 1.87 single LP, 1.27 double LP, 15,484 DS coded, 23,980 DS inlined	28 nsec	32M - 128M/ 128K	381M - 28G	2	28/4 DSSI or 2 DSSI and 2 SDI	4 DSSI	Neither	VMS, ELN	Decnet, TCP/IP	VAR, Direct	$75,000 - $300,000 with minimum 32M-byte memory, 1 CPU, DSSI channels, power supply

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*All products listed became available after January 1988 or are scheduled to ship before January 1991. All listings are marketed as minicomputers; specific capabilities vary widely from machine to machine.

**MAI Basic Four, Inc. measures performance by the number of concurrent users that can be supported by a given machine. The GPX 5070 supports up to 160 users; the GPX 6070 up to 360; and the GPX 440 up to 47.

[1] Listed in descending order according to size: DP = Batch commercial data processing; SE = Scientific engineering; OLTP = On-line transaction processing; OA = Office automation.

[2] Millions of instructions per second.

[3] Full-precision millions of floating-point operations per second.

[4] Per-second performance ratings, based on the following industry-standard benchmarks: DH = Dhrystones Version 1.1, unless Version 2.1 is noted; DC = Debit/Credit (transactions based on 95% subsecond response); LP = Linpack (100 x 100 full-precision in MFLOPS); LL = Livermore Loops (harmonic mean; 14 loops); TPC/A = the first benchmark implemention of the Transaction Processing Council. Vendors supplied either actual or estimated benchmark figures.

[5] VUP = VAX units of performance, a measurement used by DEC in which one VUP = the performance of the VAX-11/780.

[6] Specifications for IBM machines were collected from numerous sources, including in-house sources; written materials supplied by the vendor and Datapro Research, a market research firm in Delran, N.J., Technology Investment Strategies Corp., a market research firm in Framingham, Mass., and The Meridian Group and Meridian Technology Leasing Services, a leasing firm in Deerfield, Ill.

[7] NCR Corp.'s MIPS performance is based on Dhrystone Version 1.1, in which 1,757 Dhrystones = 1 MIPS.

Harris Computer Corp. sells the HCX and H series minicomputers but chose not to supply information on these machines. Interested readers should call the company directly at (800) 442-7747.

The companies included in this chart responded to a recent survey conducted by *Computerworld.* When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

VENDOR	PRODUCT	PRIMARY MARKETS[1]	COMPARABLE SYSTEMS	MAXIMUM NUMBER OF CPUs	PERFORMANCE (MIPS)[2]	PERFORMANCE (MFLOPS)[3]	BENCHMARKS[4]	MACHINE CYCLE TIME	MEMORY RANGE/ MAXIMUM CACHE (BYTE)	DISK CAPACITY (BYTE)	DISK TRANSFER RATE (MBYTE/SEC.)	MAXIMUM NUMBER PORTS/ MAXIMUM NUMBER CHANNELS	CHANNEL SPEED (MBYTE/SEC.)	SUPPORTS PARALLEL PROCESSING OR FAULT TOLERANCE	OPERATING SYSTEMS SUPPORTED	NETWORK ARCHITECTURE SUPPORTED	DISTRIBUTION CHANNEL	BASE PRICE
Digital Equipment Corp. **(800) 344-4825**	VAX 6000, Models 310, 320, 330, 340, 350, 360	DP, SE, OLTP	HP 3000 Model 949	6	3.8 - 22 VUPs	0.86	6,507 DS; 14 - 49.6 DC trans/sec.; 0.588 LP (actual)	60 nsec	32M - 256M/ 257K per processor	5,900G	2.8	Unlimited/992	2	Parallel processing	VMS, Ultrix, VAX ELN, VAX System V, DSM	SNA. Decnet, FDDI	OEM, VAR, Direct	$141,645 - $406,655 with minimum 32M-byte memory, 1 CPU, 2 channels, 296M-byte tape drive, power supply
	VAX 6000, Models 210, 220, 230, 240	DP, SE, OLTP	HP 3000 Model 935	4	2.8 - 11 VUPs	0.61	4,822 DS; 6 - 18.2 DC trans/sec; 0.433 LP (actual)	80 nsec	32M - 256M/ 257K per processor	5,900G	2.8	Unlimited/992	2	Parallel processing	VMS, Ultrix, VAX ELN, VAX System V, DSM	SNA, Decnet, FDDI	OEM, VAR, Direct	$106,680 - $221,865 with minimum 32M-byte memory, 1 CPU, 1 channel, 95M-byte tape drive, power supply
	VAX 6000, Models 410, 420, 430, 440, 450, 460	DP, SE, OLTP	HP 3000 Model 955, IBM AS/400 B70	6	7 - 36 VUPs	23.7 LP 1,000 x 1,000 full precision	12,980 DS; 8.4 - 33.4 DC trans/sec.; 3.8 LP (actual)	28 nsec	32M - 256M/ 129K per processor	5,900G	2.8	Unlimited/992	2	Parallel processing	VMS, Ultrix, VAX ELN, VAX System V, DSM	SNA, Decnet, FDDI	OEM, VAR, Direct	$175,300 - $960,000 with minimum 32M-byte memory, 1 CPU, 2 channels, 296M-byte tape drive, power supply
Encore Computer Corp. **(800) 933-6267** **(305) 797-5430**	Multimax 510	DP, OLTP, SE	DEC VAX, Pyramid Miserver, HP 9000, Sequent Symmetry	10	17 - 85	NP	12,953 DS (actual)	33 nsec	32M - 320M/NP	600M - 9.6G	1.5 - 25.5	512/7	4	Parallel processing	Unix System V	Decnet	OEM, VAR, Direct	$156,000 - $1,000,000 with minimum 32M-byte memory, 2 CPUs, 1 ENET/SCSI channel, 1 console terminal, tape drive, 600M-byte disk capacity
	Multimax 520	DP, OLTP, SE	DEC VAX, Pyramid Miserver, HP 9000, Sequent Symmetry	20	17 - 170	NP	12,953 DS (actual)	33	32M - 640M/NP	168M - 676M	1.5 - 49.5	1,024/13	4	Parallel processing	Unix System V	Decnet	OEM, VAR, Direct	$199,000 - $4,000,000 with minimum 32M-byte memory, 2 CPUs, 1 ENET/SCSI channel, 1 console terminal, 1G-byte disk capacity
	Concept 32/2000 Models 32/2030, 32/2040, 32/2050	SE, DP	Harris 3400, 3800, Nighthawk 1280, 1400; IBM RS/6000, Concurrent micro 3 and 5	64	12	1.5	1.5 LP (estimate); 12 whetstones single precision (actual)	75 nsec	4M - 256M/No cache	300M - 1.2G	3	256/ 100+	13	Neither	MPX32	Reflective memory	OEM, Direct	$139,000 - $1,800,000 with minimum 4M-byte memory, 1 CPU, power supply
GEAC Ltd. **(416) 475-0525**	9000 series, Models 9502 - 9508, 9302 - 9304	OLTP, DP, OA	Stratus XA2000, Tandem CLX	8	2.5 - 10	NP	10 DC trans/sec. (actual)	100 nsec	4M - 64M/No cache	368M - 659G	2.5	744/8	13	Parallel processing, fault tolerance	GEOS proprietary	OSI	VAR, Direct	$65,000 - $360,000 with minimum 4M-byte memory, 2 CPUs, 2 channels, terminal, 4 power supplies
General Automation, Inc. **(714) 778-4800**	GA 680 3000, 8000	DP, OLTP	Ultimate, Adds, Prime, McDonnell Douglas	1	25	NP	NP	75 nsec	1M - 256M/ 64K	40M - 10G	4	256/NP	NP	Neither	Pick	Proprietary	VAR	$10,000 - $500,000 with minimum 4M-byte memory, 1 CPU, 8 terminals, tape drive, power supply, 95M-byte disk capacity
Hewlett-Packard Co. **(800) 752-0900**	HP 9000 Model 1240	Telecommunications, OLTP, DP	Tandem, Stratus	64	3 - 192	NP	250 DC trans/sec. (actual)	50 nsec	16M - 8G/16M	0.5G - 100G	NP	10,000/-96	0.5	Fault tolerance	HP-UX proprietary Unix System V.3	SNA, New Wave Computing	OEM, VAR, Direct	$299,000+ with minimum 32-M byte memory, 2 CPUs, 2 channels, 32 terminals, tape drive, 2 power supplies, 1.1G byte disk capacity
	HP 9000 Models 808S, 815S	DP, OLTP, SE, Open systems	Decsystem 5, IBM RS/6000, NCR Tower	1	7	0.7 double precision	NP	62.5 nsec	8M - 56M/64K	150M - 8000M	1.4 - 2.5	96/1	32	Neither	HP-UX	SNA, Decnet, OSI, TCP/IP	OEM, VAR, Direct	$14,900 - $19,500 with minimum 8M-byte memory, 1 CPU, cartridge tape drive, power supply, 150M- or 335M-byte disk capacity
	HP 9000 Models 822, 832	DP, OLTP, SE, Open systems	IBM RS/6000, Decsystem, Sun Sparcserver	1	11 - 15	2.1 double precision	NP	67 - 80 nsec	8M - 128M/ 128K	335M - 80G	1.4 - 2.5	160/1	32	Neither	HP-UX	SNA, Decnet, OSI, TCP/IP	OEM, VAR, Direct	$27,900 - $51,200 with minimum 8M- or 16M-byte memory, 1 CPU, terminal console, DAT tape drive, power supply, 335M-byte disk capacity
	HP 9000 Models 825S, 835S, 835SE, 845S, 845SE	OLTP, DP, SE, Open systems	IBM RS/6000, Decsystem, Sun Sparcserver	1	10 - 23	0.7 - 2.8 double precision	NP	33.3 - 80 nsec	8M - 128M/ 256K	335M - 22.44G	1.4 - 2.5	342/2	8	Neither	HP-UX	SNA, Decnet, OSI, TCP/IP	OEM, VAR, Direct	$25,500 - $130,000 with minimum 8M- to 32M-byte memory, 1 CPU, power supply
	HP 9000 Models 855S, 860S, 870S/100, 870S/200	OLTP, DP, SE, Open systems	DEC VAX 6000 and 9000, Sequent Symmetry, Pyramid Miserver	2	14 - 95	2.1 - 26 double precision	NP	20 - 40 nsec	48M - 78M/ 1,024K	335M - 85.8G	1.4 - 2.5	800/12	8	Neither	HP-UX	SNA, Decnet, OSI, TCP/IP	OEM, VAR, Direct	$188,500 - $689,000 with minimum 48M, 96M or 128M memory, 1 or 2 CPUs, 2 channels, power supply
	HP 3000 Models 955, 960, 980/100, 980/200	OLTP, DP, Open systems	IBM AS/400 and low end 3090, DEC VAX 6000, 9000	2	NP	NP	18 or 19 - 100+ TPC/A estimates for 950, 955, 980/100, 980/200; actual for 960)	13 - 21 nsec	64M - 1G/ 1,024K per processor	670M - 856G	1.4 - 2.5	850/4	20	Neither	MPE/XL	SNA, New Wave Computing, OSI, ARPA	OEM, VAR, Direct	$240,000 - $1,090,000 with minimum 96M- or 250M-byte memory, CPU, 2 channels, power supply
	HP 3000 Models 920, 922LX, 922RX, 922, 932	OLTP, DP, Open systems	IBM AS/400, DEC VAX 3100, 4000, 3800	1	NP	NP	4.95 - 13.6 TPC/A (estimates for Model 920, actual for 922s and 932)	62.5 - 67 nsec	24M - 128M/ 128K	670M - 22G	1.4 - 2.5	240/1	20	Neither	MPE/XL	SNA, New Wave Computing, OSI, ARPA	OEM, VAR, Direct	$27,000 - $79,500 with minimum 24M- or 32M-byte memory, CPU, console terminal, tape drive, power supply, 670M- to 1.3G-byte disk capacity
	HP 3000 Models 925, 935, 949	OLTP, DP, Open systems	IBM AS/400, DEC VAX 6000	1	NP	NP	6 or 7 - 32.2 TPC/A (actual)	33 - 80 nsec	32M - 192M/ 640K	670M - 416G	1.4 - 2.5	400/2	20	Neither	MPE/XL	SNA, New Wave Computing, OSI	OEM, VAR, Direct	$70,000 - $230,000 with minimum 32M- or 64M-byte memory, CPU, 2 channels

VENDOR	PRODUCT	PRIMARY MARKETS[1]	COMPARABLE SYSTEMS	MAXIMUM NUMBER OF CPUs	PERFORMANCE (MIPS)[2]	PERFORMANCE (MFLOPS)[3]	BENCHMARKS[4]	MACHINE CYCLE TIME	MEMORY RANGE/ MAXIMUM CACHE (BYTE)	DISK CAPACITY (BYTE)	DISK TRANSFER RATE (MBYTE/SEC.)	MAXIMUM NUMBER PORTS/ MAXIMUM NUMBER CHANNELS	CHANNEL SPEED (MBYTE/SEC.)	SUPPORTS PARALLEL PROCESSING OR FAULT TOLERANCE	OPERATING SYSTEMS SUPPORTED	NETWORK ARCHITECTURE SUPPORTED	DISTRIBUTION CHANNEL	BASE PRICE
IBM[6] **Contact local sales office**	Enterprise System/9000 Models 320, 260	DP	NA	1	18 or 22	7	NP	NP	32M - 256M/NP	1,024M (max)	NP	NP/48	4.5	Neither	VSE/ESA, VM/ESA	SNA, TCP/IP	Direct	$1,125,000 - $1,470,000
	ES/9000 Models 150,130,120	DP	NA	1	2.0 - 5.4	NP	NP	NP	16M - 256M/NP	NP - NP	NP	NP/12	4.5	Neither	VSE/ESA, VM/ESA	SNA, TCP/IP	Direct	$70, 480 - $165,480
	AS/400 Models 9402 C04, C06	DP	NA	NP	NP	NP	NP	NP	8M - 16M/NP	640M - 1,280M	NP	NP	NP	Neither	OS/400	SNA	Direct	NP
	AS/400 Models C10, C20, C25	DP	NA	NP	1.3	NP	NP	20 nsec	4M - 40M/NP	630M - 3,840M	1.2 - 1.25	36/NP	NP	Neither	OS/400	SNA	Direct	$24,145 - $43,570
	AS/400 Models B35, B45, B50, B60, B70	DP	NA	NP	0.87 - 3.5	NP	2.1 - 7.1 Ramp C trans./sec.	94 nsec for B35; others NP	8M - 192M/ NP	400M - 54.8G	5.7 for B35; others NP	72 ports for B35; channels and ports for others NP	NP	Neither	OS/400	SNA	Direct	$84,125+
	AS/Entry Model 9402 Y10	DP	NA	NP	NP	NP	NP	NP	1M - 2M/NP	160M - 640M	NP	NP/NP	NP	NP	SSP	SNA	Direct	$11,000 - $17,500
ICL **(714) 458-7282 in U.S.** **(66) 344-481000 in UK**	DRS 6000, Level 50	Server, OLTP, DP, SE	HP 9000, IBM RS/6000	1	23	5 double precision	40,400 DS Version 2.1 (actual)	33 MHz	32M - 128M/ 128K	15G - 19G	4	384/39 cards	40 or 88	Neither	Unix System V.4	SNA, OSI, ICL IPA, TCP/IP	OEM, VAR, Direct	$140,000+ with minimum 32M-byte memory, 1 CPU, tape drive, power supply, 1.5G-byte disk capacity
	DRS 6000, Level 40	Server, OLTP, DP, SE	HP 9000, IBM RS/6000	1	17.5	3.7 double precision	30,300 DS Version 2.1 (actual)	25 MHz	16M - 112M/ 128K	760M - 19G	4	384/39 cards	40 or 88	Neither	Unix System V.4	SNA, OSI, ICL IPA, TCP/IP	OEM, VAR, Direct	$120,000+ with minimum 16M-byte memory, 1 CPU, tape drive, power supply, 760M-byte disk capacity
	DRS 400, Levels 62, 68, 78, 88	Server	NP	1	6	NP	NP	25 MHz	8M - 64M/64K	300M - 2.6G	15	80/11 cards	4	Neither	Unix System V.3.2	SNA, OSI, ICL IPA, TCP/IP	VAR, Direct	$25,000 - $41,000 with minimum 8M- or 16M-byte memory, 1 CPU, tape drive, power supply, 300M- or 660M-byte disk capacity
International Parallel Machines, Inc. **(508) 990-2977**	IP-1	SE, Other, DP, OLTP	DEC VAX 9000, Convex C240	33	30	10	2 LL, 8 LP (actual)	100 nsec	8M - 256G/1M	190M - 4G	10	200/200	10	Parallel processing	Unix, Ipos	Ethernet, TCP/IP	OEM, Direct	$49,000 - $1 million with minimum 8M-byte memory, 1 CPU, tape drive, power supply, 8 terminals, 190M-byte disk capacity
MAI Basic Four, Inc. **(714) 731-5100**	GPX, Model 5070	OLTP, DP, SE	AT&T 3B2, Prime Series 50, IBM RS/6000 Model 530	4	NP	NP	**	20 MHz	8M - 48M/ 128K	355M - 3.35G	1.9	256/12	NP	Neither	Boss/VX Dual Universe	Ethernet, TCP/IP	VAR, Direct	$69,000 - $300,000 with minimum 8M-byte memory, 2 CPUs, 120M-byte cartridge tape drive, power supply, 355M-byte disk capacity
	GPX, Model 6070	OLTP, DP, SE	Same as above	10	NP	NP	**	20 MHz	16M - 96M/ 320K	670M - 11.39G	1.9	512/16	NP	Neither	Boss/VX Dual Universe	Ethernet, TCP/IP	VAR, Direct	$107,400 - $500,000 with minimum 16M-byte memory, 2 CPUs, 120M-byte cartridge tape drive, power supply, 670M-byte disk capacity
	GPX, Model 440	OLTP, DP, SE	Altos 2000, NCR Tower 32	1	NP	NP	**	25 MHz	4M - 16M/32K	200M - 1,340M	1.6 - 1.9	64/7	NP	Neither	Boss/VX Dual Universe	Ethernet, TCP/IP	VAR, Direct	$18,360+ with minimum 4M-byte memory, 1 CPU, 120M-byte cartridge tape drive, power supply, 200M-byte disk capacity
Mips Computer Systems, Inc. **(408) 720-1700**	Riscomputer, Model RC 3230	DP, SE	Sun Sparcstation 1+, IBM RS/6000 Model 320	1	25	3.6	3.6 LP double precision, 6.0 LP single precision	40 nsec	8M - 128M/ 32K	200M - 6G	5	34/2	5	Neither	Unix System V.3.2, BSD 4.3, RISC/OS 4.5	SNA, Decnet, ONC	OEM, VAR	$8,490 - $21,740 with minimum 8M-byte memory, 1 CPU, 120M-byte ¼-in. tape drive, 220-W power supply, 200M-byte disk capacity
	Riscomputer, Model RC 3240	DP, SE	Sun Sparcstation 330, DEC 5400, HP 9000 Model 832, IBM RS/6000 Model 520	1	25	3.1	3.1 LP (actual)	40 nsec	8M - 64M/64K	328M - 1G	10 - 23	128/1	1.2	Neither	Unix System V3.2, BSD 4.3, RISC/OS 4.5	SNA, Decnet, ONC	OEM, VAR	$25,000 - $40,000 with minimum 8M-byte memory, 1 CPU, 120M-byte 1/4 in. tape drive, 400-W power supply, 328M-byte disk capacity
	Riscomputer, Model RC 3260	DP, SE	Sun Sparcserver 470, DEC 5810, HP 9000, IBM RS/6000 Model 520	1	25	3.9	3.9 LP (actual)	40 nsec	16M - 128M/ 64K	328M - 663M	10 - 23	128/2	4	Neither	Unix System V.3.2, BSD 4.3, RISC/OS 4.5	SNA, Decnet, ONC	OEM, VAR	$50,000 - $75,000 with minimum 16M-byte memory, 1 CPU, 120M-byte ¼-in. tape drive, 1,024-W power supply, 328M-byte disk capacity
	Riscomputer, Model M2000	DP, SE	Sun Sparcserver 490, DEC 5810, HP 9000 Model 845, IBM RS/6000 Model 530	1	25	3.9	3.9 LP (actual)	40 nsec	16M - 128M/ 64K	328M - 2G	NP	256/4	3	Neither	Unix System V.3.2, BSD 4.3, RISC/OS 4.5	SNA, Decnet, ONC	OEM, VAR	$75,000 - $125,000 with minimum 16M-byte memory, 1 CPU, 1¼-in. tape drive, 1,025-W power supply, 663M-byte disk capacity
	Riscomputer, Model RC 6280	DP, SE	IBM RS/6000 Model 560, Sequent 9000 series, Pyramid	1	50	13.9	120,000 DS; 9.1 LP double precision (actual)	15 nsec	32M - 256M/- 592M	663M - 1.7G	2.4	256/6	60	Neither	Unix System V.3.2, BSD 4.3, RISC/OS 4.5	SNA, Decnet, ONC	OEM, VAR	$150,000+ with minimum 32M-byte memory, 1 CPU, 1 channel, terminal, tape drive, 4,500-W power supply, 663M-byte disk capacity
Modcomp, Inc. **(305) 974-1380**	Tridimensional series, Models 9720, 9730, 9735, 9740	SE	Concurrent 6300 and 6400, Encore 32/3000, Harris 3800 and 3400	1	1.7 - 2.8 whetstone	0.22 - 0.46	5,996 - 7,676 DS Version 2.1	33 MHz	16M - 40M/64K	80M - 600M	9	2/16	3	Neither	Real/IX	Decnet, TCP/IP	OEM, VAR, Direct	$20,000 - $60,000 with minimum 8M-byte memory, 1 CPU, 150M-byte cartridge tape drive, power supply, 80M-byte disk capacity
	Tridimensional series, Models 9230, 9250	SE	DEC VAX 600, 3400 - 3600; HP 9000 Models 825, 836; Harris 3400, 3800	3	2.8 - 4.3 whetstone	NP	3,300 - 4,900 DS Version 2.1	80 - 180 nsec	8M - 240M/ 32K - 64K	67M - 300M	8.8	8/256	2.2	Neither	Max proprietary	TCP/IP, SNA, Maxnet	OEM, VAR, Direct	$79,000 - $114,000 with minimum 8M-byte memory, 1 CPU, power supply

VENDOR	PRODUCT	PRIMARY MARKETS[1]	COMPARABLE SYSTEMS	MAXIMUM NUMBER OF CPUs	PERFORMANCE (MIPS)[2]	PERFORMANCE (MFLOPS)[3]	BENCHMARKS[4]	MACHINE CYCLE TIME	MEMORY RANGE/ MAXIMUM CACHE (BYTE)	DISK CAPACITY (BYTE)	DISK TRANSFER RATE (MBYTE/SEC.)	MAXIMUM NUMBER PORTS/ MAXIMUM NUMBER CHANNELS	CHANNEL SPEED (MBYTE/SEC.)	SUPPORTS PARALLEL PROCESSING OR FAULT TOLERANCE	OPERATING SYSTEMS SUPPORTED	NETWORK ARCHITECTURE SUPPORTED	DISTRIBUTION CHANNEL	BASE PRICE
NCR Corp.[7] **(513) 445-2075**	NCR Tower, Model 32/300	Departmental processing	AT&T 3B2/500	1	5.8	NP	10,266 DS (actual)	100 - 200 nsec	4M - 32M/16K	126M - 760M	1.25 - 1.65	16/3	5	Neither	Tower Release 1.01 proprietary Unix System V.3	SNA, TCP/IP	OEM, VAR, Direct	$11,290 - $20,000 with minimum 4M-byte memory, 1 CPU, 3 channels, 150M-byte tape drive, 126M-byte disk capacity
	NCR Tower, Model 32/500	Same as above	Same as above	1	5.8	NP	10,242 DS (actual)	100 - 200 nsec	4M - 64M/16K	126M - 2.3G	1.25 - 1.65	32/7	5	Neither	Tower Release 1.01 proprietary Unix System V.3	SNA, TCP/IP	OEM, VAR, Direct	$15,050 - $63.900 with minimum 4M-byte memory, 1 CPU, 7 channels, 150M-byte tape drive, 126M-byte disk capacity
	NCR Tower, Model 32/700	Same as above	HP 9000 Model 815	1	8.8	NP	15,487 DS (actual)	66 - 132 nsec	4M - 64M/32K	126M - 2.3G	1.25 - 1.65	96/7	5	Neither	NP	SNA, TCP/IP	OEM, VAR, Direct	$23,500 - $76,000 with minimum 4M bytes of memory, 1 CPU, 7 channels, 150M-byte tape drive, 760M-byte disk capacity
	NCR Tower, Model 32/825	Same as above	Sequent 527	6	6.6	NP	11,655 DS (actual)	100 nsec	8M - 128M/ 240K	170M - 1.5G	1.21 - 1.65	256/10	40	Neither	Tower Release 2.0 proprietary Unix System V.3	SNA, TCP/IP	OEM, VAR, Direct	$59,950+ with minimum 8M-byte memory, 1 CPU, 10 channels, 150M-byte tape drive, 760M-byte disk capacity
	NCR Tower, Model 32/850	Same as above	Same as above	6	6.6	NP	11,655 DS (actual)	100 nsec	8M - 384M/ 240K	170M - 3.8G	1.21 - 1.65	512/20	40	Neither	Tower Release 2.0 proprietary Unix System V.3	SNA, TCP/IP	OEM, VAR, Direct	$81,300+ with minimum 8M-byte memory, 1 CPU, 20 channels, 150M-byte tape drive, 760M-byte disk capacity
Prime Computer, Inc. **(508) 655-8000**	50 series, Models 2455, 5320, 5340, 4450, 6150, 6450, 6650	DP, OLTP, SE	HP 3000, DEC VAX 4000, IBM AS/400	2	1.6 - 28	0.233 - 3.791 single precision	2,488 - 60,526 DS; 0.2 - 4.7 LP (200 x 200) BLAS (actual)	36.6 - 120 nsec	4M - 128M/ 128M	673M	2.5	512/- 32,000	5 - 24	Neither	Primos	SNA	VAR, Direct	$20,000 - $1,000,000 with minimum 4M-byte memory, 1 CPU, 32 channels, terminal, tape drive, power supply, 328M-byte disk capacity
Pyramid Technology Corp. **(415) 965-7200**	Miserver series, Models MIS-12T, MIS-4, MIS-2, MIS 1/1	OLTP, DP, SE	Sequent, Symmetry, HP 9000 Model 800, DEC 5800	12	14 VUPs	0.76	15,625 DS; 208 DC; 0.76 LP (actual)	100 nsec	16M - 512M/ 12M	323M - 64G	2.46	2,000/16	11	Neither	Unix System V.3, BSD 4.2 and higher	SNA, Decnet, TCP/IP	OEM, VAR, Direct	$50,000 - $2 million with minimum 16M-byte memory, 1 CPU, 2 channels, ¼-in. tape drive, power suppy, 323M-byte disk capacity
Stratus Computer, Inc. **(508) 460-2000**	XA2000 Continuous Processing Systems, Models 30, 75, 80, 200 - 260	OLTP	DEC VAX 6000, FT3000 and dual host Microvax; Tandem VLX and CLX	6	NP	NP	99,470 trans./hour, heavy mix; 132,130 trans./hour moderate mix (actual)	42 nsec	8M - 128M/ 128K	152M - 31.2G	2.458	440/14	4	Fault tolerance	VOS, FTX version of Unix System V.3.2, Pick	OSI	OEM, VAR, Direct	$49,800 - $1,080,000 with minimum 8M- or 32M-byte memory, 1 - 6 CPUs, 1 channel, cartridge tape drive, power supply, 152M-byte disk capacity
Sequent Computer Systems, Inc. **(800) 854-0428** **(503) 626-5700**	Symmetry series, Models S3, S16, S27, S81	OLTP, DP, SE	DEC VAX 6000, Pyramid Miserver	30	8 - 150	0.7 - 10.5	0.35 LP	33 MHz for S3; 20 MHz for others	8M - 384M/ 128K	150M - 44G	3	258/14	2.4	Parallel processing	Dynix, Unix System V	SNA, Decnet, TCP/IP	OEM, VAR, Direct	$29,950 - $1 million with minimum 8M-byte memory, 1 CPU. terminal. SCSI tape drive, power supply, 300M-byte disk capacity
Sequoia Systems, Inc. **(508) 480-0800**	Series 300	OLTP, Unix, DP, SE	Tandem Cyclone, Stratus XA2000 M2	64	8 - 150	NP	251 DC	20 MHz	16M - 20G/256K	760M - 2,000G	NP	3,000/1	80	Fault tolerance	Unix System V.3	SNA, TCP/IP	OEM, VAR, Direct	$300,000 - $1.5 million with minimum 32M-byte memory, 2 CPUs, 12 channels, 32 terminals, tape drive, eight power supplies, 1.56G-byte disk capacity
Tandem Computers, Inc. **(408) 725-6000**	Nonstop CLX, Models CLX 600, CLX 700	OLTP, DP	IBM AS/400, HP 3000, DEC VAX 6000	16	NP	NP	3.7 DC (actual)	91 nsec	6M/128K	300M - 203G	2	48/2	20	Both	Guardian 90	Tandem Expand, OSI	OEM, VAR, Direct	$39,750 - $405,000 with minimum 6M-byte memory, 1 CPU, 2 channels, terminal, tape drive, 2 power supplies, 300M-byte disk capacity
Unisys Corp. **(215) 986-4011**	U 6000 series, Model 31	Departmental processing, DP, OLTP, SE	Altos 1000, HP 9000, NCR Tower, Data General Aviion	1	5	NP	8,179 DS (actual)	50 nsec	4M - 12M/No cache	80M - NP	NP	28/1	4	Neither	Unisys version of Unix System V.3.2	SNA, Decnet, OSI	OEM, VAR, Direct	$11,500 - $35,000 with minimum 4M-byte memory, 1 CPU, channel, 150M-byte tape drive, 220-W power supply, 80M-byte disk capacity
	U 6000 series, Model 55	Departmental processing, DP, OLTP, SE	DEC 3100, IBM AS/400, HP 9000, Data General Aviion	1	10	NP	17,048 DS (actual)	30 nsec	4M - 80M/64M	168M - 4G	1.5	59/1	3.3	Neither	Unisys version of Unix System V.3.2	SNA, Decnet, OSI	OEM, VAR, Direct	$28,450 - $80,000 with minimum 4M-byte memory, 1 CPU, channel, 150M-byte tape drive, 472-W power supply, 168M-byte disk capacity
	U 6000 series, Model 60	Departmental processing, DP, LTP, SE	HP 9000, DEC 3100, IBM AS/400, NCR Tower, Data General Aviion	1	15	NP	25,000 DS (actual)	40 nsec	4M - 80M/64M	168M - 4G	1.5	59/1	3.3	Neither	Unix System V.3	SNA, Decnet, OSI	OEM, VAR, Direct	$32,400 - $90,000 with minimum 4M-byte memory, 1 CPU, channel, 150M-byte tape drive, 472-W power supply, 340M-byte disk capacity
	U 6000 series, Model 51	Departmental processing, DP, OLTP, SE	IBM AS/400, NCR Tower, HP 9000, Data General Aviion	1	8	NP	12,576 DS (actual)	40 nsec	4M - 80M/64M	168M - 4G	1.5	43/1	3.3	Neither	Unisys version of Unix System V.3.2	SNA, Decnet, OSI	OEM, VAR, Direct	$20,850 - $60,000 with minimum 4M-byte memory, 1 CPU, channel. 150M-byte tape drive, 472-W power supply. 168M-byte disk capacity
	U 6000 series, Models 70, 80	DP, OLTP, SE	Pyramid Miserver, DEC 6000, HP 9000	20	10 - 100	0.7 - 10.5	7,300 single, 4,550 double precision FPA whetstone (actual)	20 MHz	8M - 384M/ 128K	337M - 112G	3	256/14	3	Parallel processing	Unisys version of Unix System V.3.2	SNA, Decnet, OSI, DCA	VAR, Direct	$79,900 - $1,000,000+ with minimum 8M-byte memory, 2 CPUs, 16 terminals, 150M-byte tape drive, power supply, 380M-byte disk capacity
Wang Laboratories, Inc. **(508) 459-5000**	VS 8000, Models 8260, 8270, 8280, 8460, 8470, 8480	DP, OLTP	IBM AS/400, B60 VP, DEC VAX 6000	1	NP	NP	10,000 DS; 6,726 US Steel (actual)	60, 90 or 120 nsec	8M - 64M/ 128K	76M - 40G	3	999/15	Up to 33	Neither	Wang VS/OS, IN/IX	SNA, OSI, TCP/IP	VAR, Direct	$105,000 - $611,000 with minimum 8M- to 32M-byte memory, one CPU, channel, terminal, 2 power supplies
	VS 10000, Models 50, 75, 100	DP, OLTP, Server, OA	IBM 4381, DEC VAX	1	NP	NP	12,500 DS	44, 77 or 110 nsec	16M - 256M/ 32M	314M - 37.6G	3	900/80	33.3	Neither	VS/OS, IN/IX proprietary Unix	SNA, OSI	VAR, Direct	$525,000 - $750,000 with minimum 32M-byte memory, 1 CPU, 15 channels, 1 terminal, 2 power supplies

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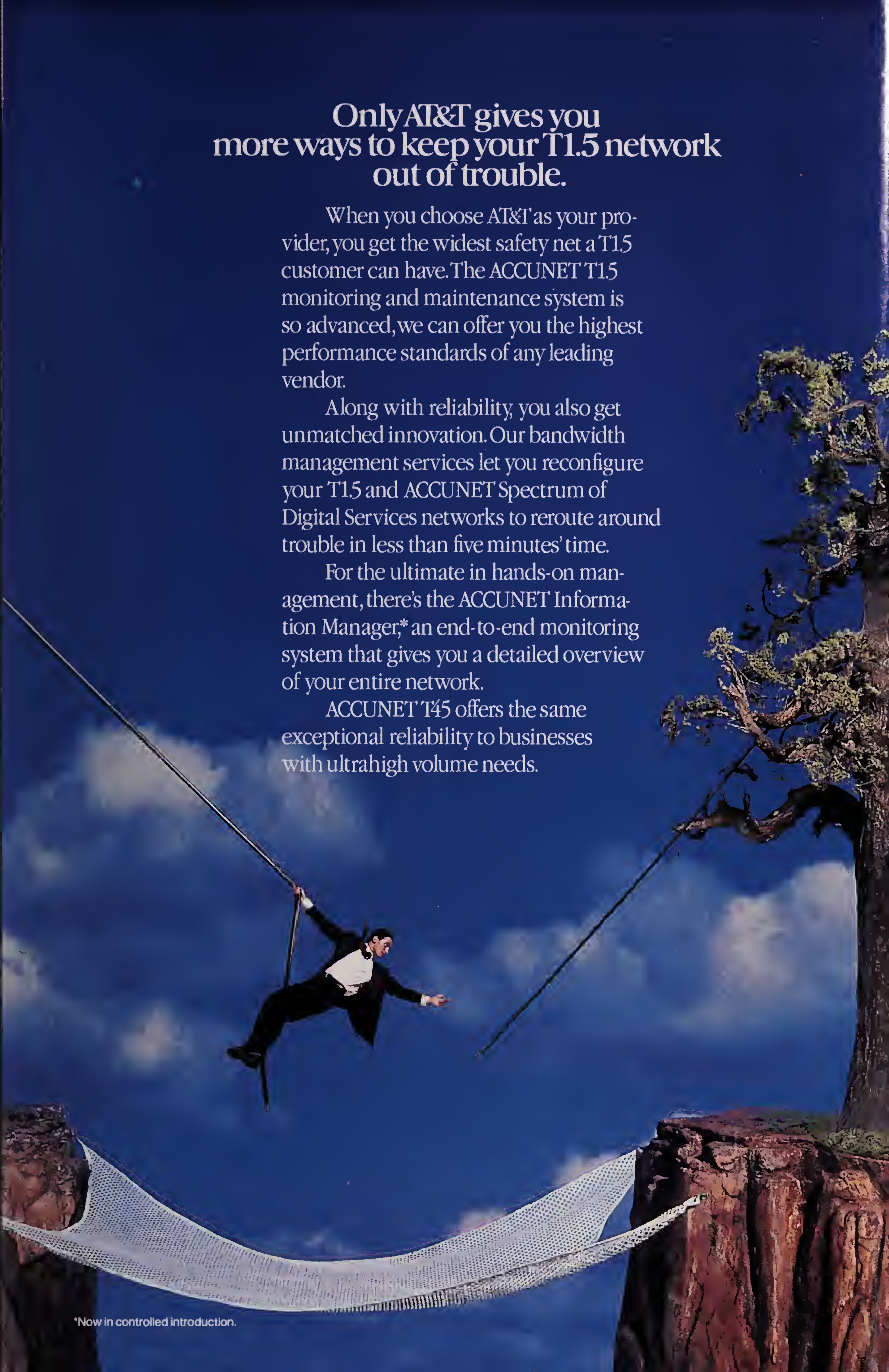

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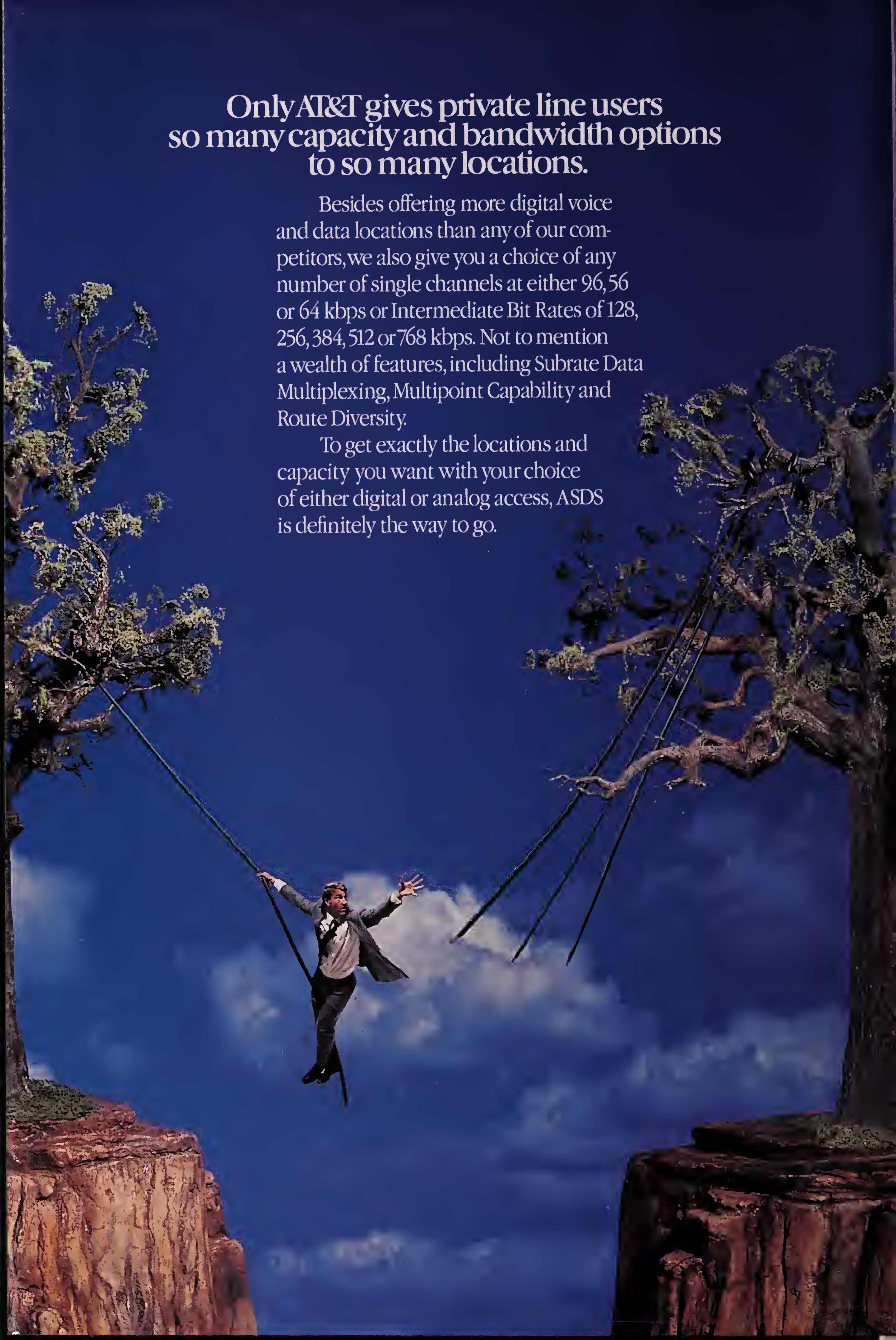

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R&D group chugs along

MCC's research is low-key but steady

MCC

CONTINUED FROM PAGE 1

Zigy Kaluzny

Fields (left) and Dove *have different styles but the same objective for MCC*

unspectacular, technical advances has also done little to alter the public perception that MCC has yet to justify its existence.

In fact, MCC's mission is to find a way for corporations to leverage long-term (four to 10 years) applied research in critical technology disciplines. In the coming global technology wars, it is to be *part* of the solution, not the whole solution, says David Gibson, a professor of management science at the University of Texas at Austin who is writing a book about MCC. But the criticisms persist. Among them are the following:

- No major breakthrough technologies have emerged from MCC.
- Consortiums in the U.S. do not work.
- Member companies do not send their best people to MCC; therefore, the best research and development is not done there.
- Some shareholder companies are unhappy with MCC and the results they are getting for their money.
- MCC has done little or nothing to slow Japan's technology juggernaut.

Ironically, no one associated with MCC ever made the alleged promise to quell the Japanese threat. Yes, MCC was formed in response to publicity about Japan's vaunted Fifth Generation Project and set out to build advanced AI tools. But William Norris, former chairman of Control Data Corp. and the catalyst behind MCC, was simply sounding an alarm that the U.S. was in danger of losing its competitive edge if companies refused to band together.

Yet, because of the timing and rhetoric surrounding MCC's birth, the consortium suffered through an infancy of misplaced perception. "The original expectations surrounding MCC were unrealizable from the word go," says Ralph Gomory, president of the Alfred P. Sloan Foundation and former senior vice-president for science at IBM. "You can't, by any stretch of the imagination, improve U.S. competitiveness with Japan with an organization of 400 people. That was a delusion from the start."

As for the other charges, criticism of MCC tends to come in the form of blanket skepticism about consortiums from people who have not looked closely at MCC. Attempts to find detractors among the current and former shareholders turned up no one willing to speak on the record.

Critical, if not breakthrough, technology has been and is being transferred to shareholder companies in the areas of packaging, expert systems, software development and computer-aided design. Major programs in superconductivity, holographic storage, neural networks and other leading-edge technologies are under way.

"NCR's product development has been greatly influenced by technology, processes and concepts from MCC," says Roy Coons, director of applied research at NCR Corp., a founding member of the consortium.

"We don't look for a detailed return on investment analysis," adds Tom Gannon, director of technology planning and development at Digital Equipment Corp. "We ask, 'How much would it cost DEC to do it on our own? What is the leverage factor?' On MCC's CYC knowledge-base project, for example, there are seven companies paying $500,000 each, so we figure it would cost DEC five to 10 times that to do it alone. We're pleased with the results." (See story page 90.)

Coons concedes that it has taken MCC longer to produce worthwhile results than originally expected. "We lost a couple of years because we were the pioneers with the arrows in our backs," he says. "We had no one else to look to."

But skeptics in industry, academia and especially the media point to a dearth of technologies flowing out of MCC's doors and say that by now, much more should have been accomplished.

"Companies just won't send their best people to MCC. They say they want to

MCC Roster

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* *Actively funding research*

Source: MCC

CW Chart: Paul Mock

participate, but they only send second- or third-level people. For that reason, it hasn't worked," says Harvey Newquist, an AI consultant based in Scottsdale, Ariz. "The members are competitors; everyone is working to the common good until it affects the corporate bottom line," he says. "The concept just can't work."

The nearly 50 shareholders and associate members who are pouring $60 million into MCC annually don't believe that. "We've learned how to collaborate and remain intense competitors," says Frederic Schwettmann, general manager of circuit technology at Hewlett-Packard Co., an MCC shareholder.

As it heads into the 1990s, MCC is quietly poised to show its detractors that it is hardly an underachiever.

"The expectations were perhaps too high," says Grant Dove, chairman and chief executive officer of MCC. "But I'd compare our record to any other research lab in the U.S."

Dove says he believes that long-term research is given a low priority in U.S. industry today and that "that is a niche we can provide."

But as global competitive pressures intensify, U.S. companies are starting to rethink the concept of cooperative long-term research as an alternative to the do-it-yourself mentality.

"There's actually a much better attitude today toward consortia," Dove says. "When I came to MCC [in 1987], we had 25 companies; now, we have nearly 50. Texas Instruments, Inc. had passed on MCC at first; now they are in. Apple Computer, Inc. has not joined any other consortium except MCC. Companies are starting to get comfortable with the infrastructure of cooperative development."

Initially, MCC had a rigid format in which shareholders had to pay set fees for each program in which they participated, and it was an all-or-nothing proposition. In the past two years, the consortium has eased the restrictions, building in flexibility for participation by smaller companies in parts of projects rather than entire programs. A new category of membership — associate — has been established that provides access to MCC research for a $25,000 entry fee.

Members are pleased with the changes. "Grant Dove succeeded in achieving customer focus and responsiveness," Schwettmann says. "Consensus-building is a time-consuming process, but we have achieved it."

This unbundling and shifting of the membership restrictions has brought in more than 20 associate members since 1988, including Apple, TI, AT&T, Sun Microsystems, Inc. and Tandem Computers, Inc., to join the 21 shareholder firms. Shareholders such as Allied Signal Co., which left several years ago, have rejoined as associates. Even IBM is taking part in an MCC study project, although the firm says it has no plans to join MCC.

Adding another visible checkmark to MCC's plus column is the entrance of Craig Fields (see story above). Fields, a tough, no-nonsense scientist, joined MCC as president in July after being ousted, amid controversy over his views on technology research, from his job as head of the Defense Advanced Research Projects Agency. He will succeed Dove as chairman of MCC next year, and MCC watchers say they believe Fields will provide the jump-start the organization needs to power itself during the '90s.

"Fields is definitely the right guy for MCC," says Gordon Bell, chief scientist at Stardent Computer, Inc. "He is tolerant of all kinds of ideas, but he demands results."

With more than $60 million in revenue, the for-profit MCC is financially stable, according to Dove, and its membership is growing. Earlier this month, Andersen Consulting became the 22nd shareholder.

MCC has quietly transferred more than 150 technologies to its 22 shareholders while attracting a group of world-class researchers such as Doug Lenat, Laszlo Belady and Steve Redfield, all of whom prize the innovative environment. In hiring top researchers for its own staff, MCC is acknowledging the problem that it ran

Dreams of Fields

Ex-head of DARPA may be just the person to push MCC to its R&D limits

Even when offering his version of small talk — a recipe for homemade chocolate chip cookies — Craig Fields speaks in pointed, rapid-fire bursts that bespeak his intensity. Fields, 43, is the new president of MCC and will take over as chairman and CEO, replacing Grant Dove sometime next year. Making the transition from the affable, grandfatherly Dove to Fields should be more than a bit shocking for MCC's 540 troops.

But Fields may be just the man to take MCC out of the shadows and into the spotlight of U.S. research. Even though he was fired as head of DARPA after less than one year on the job, Fields is viewed as a brilliant scientist and a prize catch for MCC.

"MCC needs a dynamic and controversial new leader who can make it live up to its billing as the flagship of all consortia," says William Norris, former chairman of CDC and the catalyst behind founding MCC in 1982. "Getting Craig Fields is a super move."

Fields apparently rubbed too many Bush administration officials the wrong way with his efforts to promote targeted commercial uses of DARPA funding. Because MCC is a private, nongovernmental outfit, Fields should find the environment more suited to his aggressive, brook-no-fools style.

His initial assessment of his new employer is mixed. He says he has no problem with the technical quality of the projects, and the staff is "super." But Fields plans to give every project a critical evaluation based on the question: Is this going to give a major competitive advantage to our shareholders? "Projects should start," he says. "But they should also stop."

Fields insists that projects be better defined, with both long-term and intermediate goals. "Technology transfer needs to be better, and our schedules need to be better. We have to set up technology transfer plans up front."

Zigy Kaluzny

Fields *will put his belief in consortiums to work*

Fields claims that he has long been a believer in consortiums and that leveraging technology investments is crucial. "I can't understand the concept that a consortium is not an American way to work," he says. "MCC is pro-competition. We're not anti-Japanese or anti-EEC. We're pro our shareholders."

The economic crisis facing high tech today only confirms Fields' belief in consortiums. "We can offer a CEO research and development at a percentage of the cost to do it alone," he says.

GLENN RIFKIN

Five distinct parts equal one synergistic whole

MCC is really four consortiums under one umbrella, and it has recently formed a fifth, called the Computer Physics Lab, to house MCC's superconductivity and optics projects. The five are as follows:

- **Advanced Computing Technology**. This group, which includes AI, human interface and neural networks, has been the most visible and probably taken the most heat. "We take the most flack for why consortia don't work," admits Deborah Pedersen, ACT's program manager. "We were the most ambitious and probably haven't focused and coordinated the effort as well as we should have."

ACT is at work on several ambitious projects such as character and symbol recognition using neural networks, natural language interfaces, an innovative Interactive Work Surface and object-oriented database design.

The most visible project, however, is Doug Lenat's CYC project. Lenat, a Stanford computer scientist, is building a vast knowledge base of millions of commonsense facts. The 10-year project, now in its sixth year, will potentially engineer the brittleness out of today's expert systems, which cannot cope with unexpected situations because of a lack of basic general knowledge.

"Learning occurs at the edge of what you know," Lenat says. "The more you know, the more you can learn. This issue has held machine learning back for 20 years." To correct this, Lenat and his team have been feeding general knowledge information into a growing database that is now halfway to completion. Lenat's ambitions are high. "Almost all software in the 21st century will be based on a platform of common sense," he says.

- **Packaging/Interconnect**. This program, which many say is the most successful of MCC's groups, has a more directed focus than ACT and has already transferred key technology to some of the shareholders.

Through the program, MCC is developing multichip modules that allow greater chip densities and higher performance while lowering fabrication costs. The goal is to create technologies necessary to produce a 10-million gate, 100-chip computer costing $1,000.

Incorporating tape automated bonding techniques and creating an innovative laser bonder, the program has already transferred high-performance interconnect technology, which DEC incorporated in its VAX 9000 mainframe product. "This is concrete work that was done at the consortium and lifted to support product development at DEC," says Tom Gannon, DEC's director of technology and planning.

- **CAD Program**. This MCC program includes the Framework Initiative, a broad-based industry effort that promotes the standardizaton of interfaces between computer-aided design tools and their supporting software.
- **The Software Technology Program**. One of MCC's original groups, the program is multilayered and working on tools to help design large, complex, distributed software systems. A potential breakthrough project involves hypertext-based processing used to capture the design rationale. The project, called The Design Journal, uses hypertext and groupware to capture the issues and processes of why a software program was designed a certain way.
- **The Computer Physics Lab**. The lab is now home to the High Temperature Superconductivity Program, which is aligned with renowned superconductivity guru Paul Chu at the University of Houston. In addition, Steve Redfield is working on the breakthrough-level Bobcat project, an optical computing design using a read/write holographic data storage subsystem that will potentially deliver access speeds three orders of magnitude faster than magnetic disk [CW, Aug.6].

GLENN RIFKIN

On September 20, the distance between the lab and the real world got a little shorter.

Last week, the world's largest information technology services firm became part of an exceptional computer research consortium.

Andersen Consulting is now a shareholder in MCC, the Microelectronics and Computer Technology Corporation.

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Consortiums can help companies successfully leverage their R&D

For consortiums, the key to survival is leverage. Companies must be able to obtain valuable leverage in a particular research project or it isn't worth retaining membership.

Leverage is not only based on money invested but also on time to market and the end technology itself. For MCC, its innovative laser bonder is an example of leverage at work.

The laser bonder, a device that provides high-speed inner lead bonding, was created for $2.5 million at MCC. According to Phil Spletter, an assignee from Harris Corp. and the head of the laser bonder project, the technology took five years to develop.

"It was definitely faster to do the project here," Spletter says. "No single company even tried" because of the risk and expense involved. The consortium allowed the cost and risk to be spread among the 15 shareholders interested in the device for building integrated circuits.

"If an individual company had started this, they probably would have given up," Spletter says. With associate members now allowed to participate, the project offers a 17-to-1 leverage factor.

The technology took three years "to get into a licensable state," Spletter says. The payoff came when MCC licensed the technology to ESI, a Portland, Ore., manufacturer.

Advanced Micro Devices, an MCC shareholder, is now serving as a beta-testing site for the new machine. Ironically, the patented technology attracted the Japanese bonding industry, which was, of course, turned away.

The laser bonder offers a breakthrough to the fundamental limitations of conventional bonding tools, averting the need for thousands of pounds of heat and pressure applied to these sensitive materials. It also allows a software program to control the device rather than manually changing dye sizes and components to bond different devices, cutting downtime from two hours to 10 minutes when changing devices.

The laser bonder won't replace conventional single-point bonding anytime soon. It is expected to impact the high end of VLSI and gate-array technology.

into when depending on shareholders to send top people. Now only 15% of the staff members are transfers from member firms; the rest are MCC employees.

MCC suffers most of all from the lack of a single technological breakthrough that would spread glitter across the pages of the business and trade press. This may soon change, however. MCC researchers are at work on several breakthrough-level technologies (see story page 88), and parts of these have already begun to transfer to shareholders. DEC, for example, has incorporated MCC's research in at least three critical areas of product development during the past six years.

Inman *says MCC has been plagued by technology transfer problems*

"This is a major innovation for expert systems," says DEC's Gannon, referring to Lenat's 10-year knowledge-base CYC project, which is aimed at building common sense into expert systems. "Lenat's project alone will make MCC worthwhile," Bell says.

More important than the breakthroughs is transferring new technology to members, who then turn them into products or processes. According to Bobby Ray Inman, MCC's first chairman, technology transfer was the "biggest problem" at the outset. This task was greatly underestimated.

Today, Inman says that he made a mistake by assuming "quality control" over the full-time research staff but not over the liaison types between MCC and the members. "Many of the liaisons were not first-rate and didn't command attention in their own companies," Inman says.

Though that has changed for the better, technology transfer has remained a painful process for the consortium. Shareholders such as DEC, which has a corporate culture deeply tied to outside research cooperation, have thrived at MCC. Others find more difficulty in assessing

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the benefits of the consortium.

Dan Wiersma, manager of electronic products at Eastman Kodak Co., admits that staff members are not beating down his door to request transfers to MCC. Of the nearly 3,000 R&D staffers at Kodak, only three are currently at MCC. "There are both family issues and career issues for people," Weirsma says.

"What you get out of a consortium depends on how much you put into it," Inman states. "Some members have gotten a great deal out of MCC. The remainder were waiting for packages tied with ribbons and were disappointed."

Firms such as Unisys, Gould and Mostek believed they weren't getting their money's worth and pulled out (although for Unisys, the decision to leave was made when Sperry Corp., a member, merged with Burroughs Corp., a nonmember).

University of Texas' Gibson has closely followed the consortium's efforts for the past six years, and he bristles at the criticism leveled at MCC.

"Technology transfer turned out to be much more difficult than they realized. But most U.S. firms don't do a good job of technology transfer even within their own organizations. MCC should be nurtured and critically evaluated, not looked at cynically," he says.

"A quality research organization takes years to become effective," adds Alan Chynoweth, vice-president of applied research at Bellcore, itself a consortium and member of MCC. "Sometimes individualism and competitiveness can counteract the forming of effective teams. But companies have come to realize that it's not a problem to cooperate technically even if they are competing."

However, because shareholders are reluctant to reveal product development details, much of what MCC provides gets quietly incorporated into customer projects. MCC forfeits bragging rights and gets little or no credit when a product is unveiled, Fields explains.

Of course, public relations restrictions are not the cause of all MCC concerns. Some shareholders are reportedly dissatisfied with results and are thinking of leaving the consortium. The Boeing Co., for example, is said to be one such member. A spokesman indicated that the company is reconsidering its plans to remain a member but would not elaborate on the root of its dissatisfaction.

"We've lost some, but we're getting a lot of new blood as well," Fields asserts. "The members are less happy than I'd like them to be. The key is to choose the right technologies that give them an advantage in working with us."

Dove acknowledges that MCC must provide even better leverage on its projects. "I'm not happy with our leverage here; it's still too low," he says. In other words, there is never enough funding, and MCC is seeking other avenues, such as stepped-up marketing campaigns and increased government participation.

Organizational issues also remain a major concern. Managing a diverse group of more than 500 people — some full-time staff, some assignees from member companies and some resident researchers — can be somewhat daunting.

"They have a weakness at the project manager level," says Bill Hanna, a researcher at HP's integrated circuit division who spent the last two years at MCC. "As projects grow, a project manager is needed to be the glue, the arbitrator, the vision-setter."

There is also the constant striving to upgrade the consistency of the research.

"Overall, the research has been quite spotty," says Bell, who, as DEC's vice-president of engineering in 1983, led his company into MCC. "But that's the nature of research. Researchers tend to hold the funders hostage. Craig Fields knows how to select people. He's not interested in running an old folks' home for researchers," he added.

In the end, more and more companies may turn toward MCC and other consortiums simply because competitive pressure and economic realities demand it. As the stage is set for the start of the next millenium, the U.S.' frontier attitude won't fly, according to Dove.

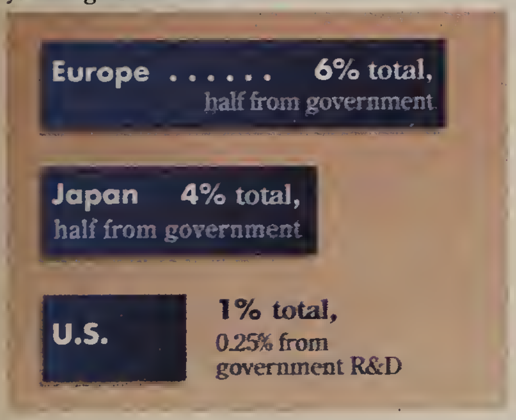
"Without a collaborative effort in electronics and computers, the U.S. won't get it done," Dove says, referring to the global technology wars. "There's simply not enough money to go around." •

Senior editor Amiel Kornel contributed to this report.

Norris *was the catalyst behind MCC*

Consortium catch-up

Compared with Europe and Japan, the U.S. spends fewer of all research dollars on funding consortiums



Source: MCC CW Chart: Paul Mock

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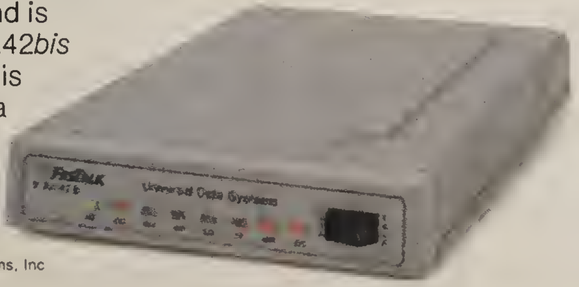

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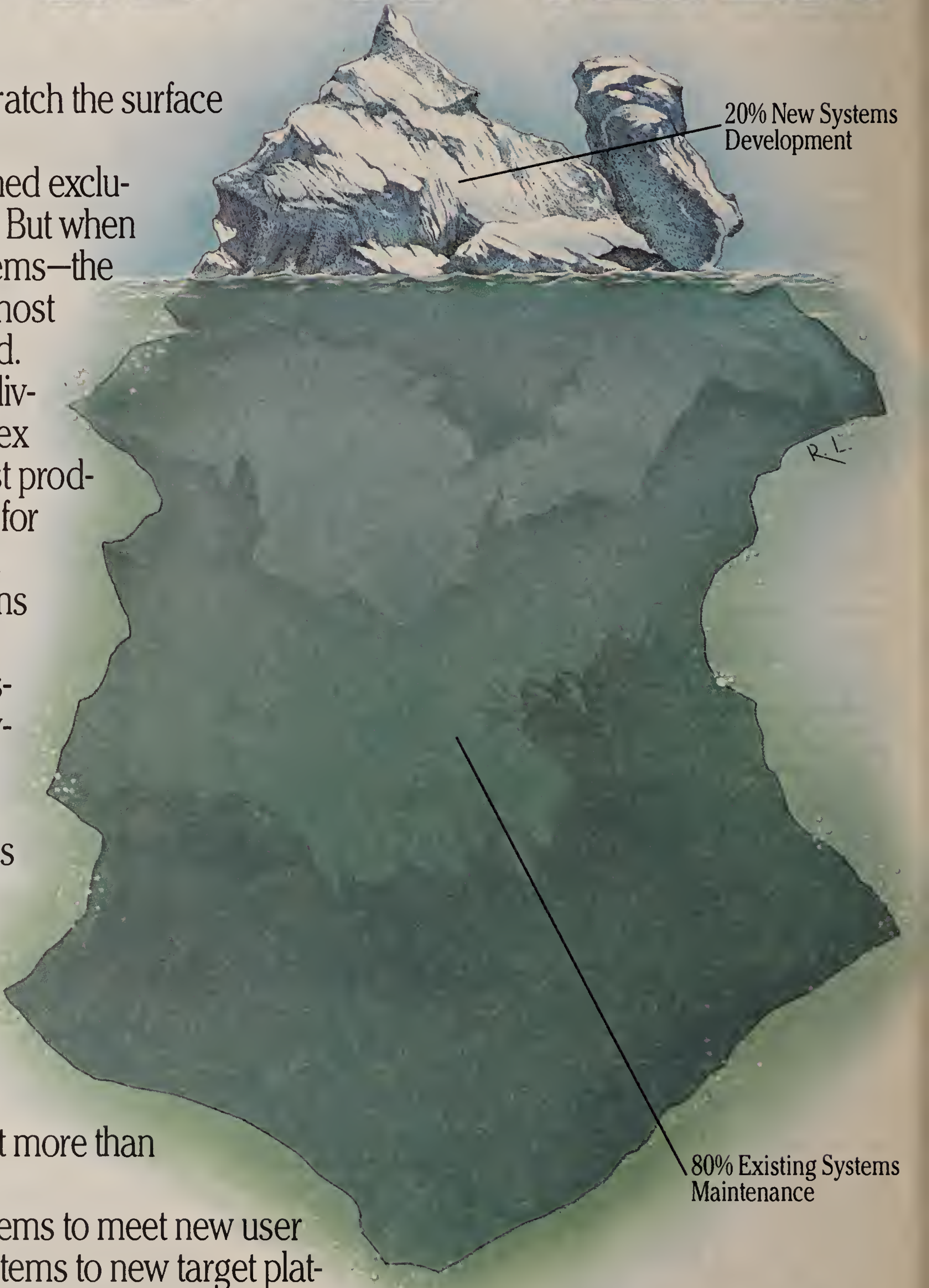

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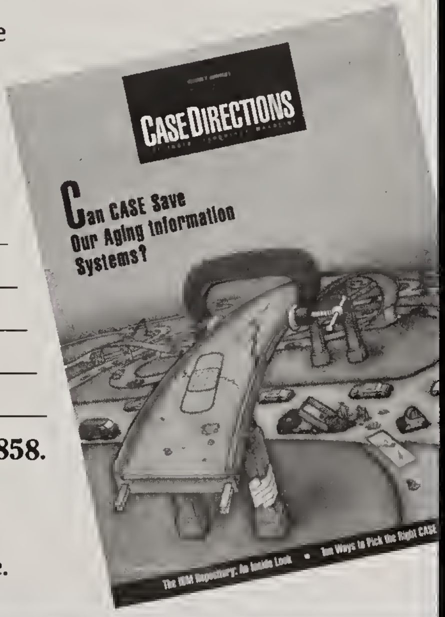
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COMPUTER INDUSTRY

NATIONAL
BRIEFS

Prime cuts revisited

In what was described by company officials as the final phase of layoffs originally announced last October, **Prime Computer, Inc.** terminated an undisclosed number of employees from its Framingham, Mass.-based manufacturing facility last week. The plant is primarily responsible for final testing and assembly work, a spokesman said. The reduction includes technicians and administrative personnel.

■

Secret of its success

Computer Task Group, Inc. has made no secret of the fact that it sees both networking and communications as pivotal and profitable technologies. Two weeks ago, the Buffalo, N.Y.-based consulting and systems integration firm put its money where its mouth is — albeit without stating exactly how much money — and bought Lowell, Mass.-based **Connolly Data Systems, Inc.** Acquiring the firm that claims to be New England's largest independent networking systems integrator will more than double Connolly Data Systems' communications staff, the company said.

More National briefs on page 96

Right to know of hazardous wastes

Environmental regulations on chemical use generating need for on-line monitoring

BY MAURA J. HARRINGTON
CW STAFF

Recently, an Oklahoma trucking company employee was sentenced to five years in prison for falsifying toxic discharge monitoring reports required by the Environmental Protection Agency (EPA).

A few months ago, a management-level employee of a reclaiming solvent company in Michigan was charged with knowingly omitting hazardous labels from toxic waste barrels — another EPA violation. That offense, coupled with other toxic waste misdemeanors, earned the employee a one-year prison sentence.

These are just two of a growing number of cases being investigated by the EPA to protect the public from corporate carelessness and the illegal disposal of hazardous wastes, as well as the government's attempt to make firms offer the public accurate records required under the Community Right-to-Know (RTK) Act.

On-line management

The amount of these records and other documents monitoring hazardous waste management required by the government every year has grown considerably in recent years. That buildup, in turn, is causing IS managers to consider maintaining and managing these records on-line in order to keep the companies they work for out of trouble, and that may mean growth for an emerging segment of the computer industry.

"The number of regulations and regulated materials has increased drastically in the past 10 years, and it will continue to grow, imposed by both the U.S. Department of Labor's Occupational Safety and Health Administration and by the EPA," said environmental analyst Richard Greenberg, of New York-based Coopers & Lybrand's Denver office.

"You may be a white-collar executive, but if you're responsible for these regulations and you break the rules, you're more likely to get caught now than you were just a few years ago," Greenberg said.

The RTK regulations require companies that use, store or emit any hazardous materials to provide complete data on these materials in the form of a material safety data sheet to any member of the community.

This federal law, passed in 1986, has prompted community and environmental interest groups and even stockholders to demand to know more information about the firms around them.

In turn, it has prompted upper management in several corporations to take a good hard look at the benefits of developing an on-line environmental tracking system, an EPA spokesman in the Boston-based New England EPA bureau said.

While the issue of implementing some sort of on-line environmental software system has been addressed by IS managers in several different industries, these real-life implementations are few and far between, even though these companies well know what must be regulated by law, according to Ronald Ratney, OSHA New England assistant regional administrator for technical support.

Continued on page 100

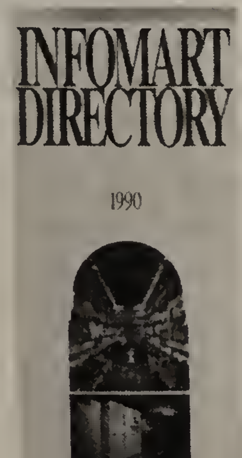
Bad news makes for a good market

The mounting burden of record-keeping in toxic waste management could force manufacturers such as these – culled from the environmental action group National Toxics Campaign Fund's list of alleged corporate polluters – to depend on information technology for help. That could let computer companies clean up – with profits

	Major toxic sites	Poor safety record	Toxic product line	Major toxic pollutants	Toxic emissions *(in thousands of pounds per year)*
American Cyanamid	☠	☠	☠	Pesticides, solvents, acids	120,300
Amoco	☠			Petrochemicals	27,100
Dow Chemical USA	☠	☠	☠	Chlorinated hydrocarbons	23,300
Du Pont	☠		☠	CFCs, chlorobenzines	223,300
Eastman Kodak	☠			Chlorinated solvents	75,800
Exxon	☠	☠		Petrochemicals	85,100
Occidental Petroleum	☠		☠	Chlorinated hydrocarbons	114,600

Source: National Toxics Campaign Fund

CW Chart: Marie Haines



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Lotus reshaping long-term goals

BY PATRICIA KEEFE
CW STAFF

CAMBRIDGE, Mass. — Shake, rattle and roll. As its stock recently bounced up from a rock-bottom price of $15 per share, Lotus Development Corp. went on the offensive, quietly revamping its sales force and publicly detailing financial expectations for the next three to five years.

Even Chief Executive Officer Jim Manzi got in on the act, after finance Senior Vice-President Robert Schechter told attendees at a recent Montgomery Securities conference that Lotus had lowered its expectations for pretax margins during the next several years from 25% to 20%.

Claiming that the message was misinterpreted, Manzi attempted to set the record straight.

"I seem to come here only when the stock is depressed," he told attendees at a Cowen & Co. conference in Boston. "We did a few things [recently] to make sure that was the case," he quipped.

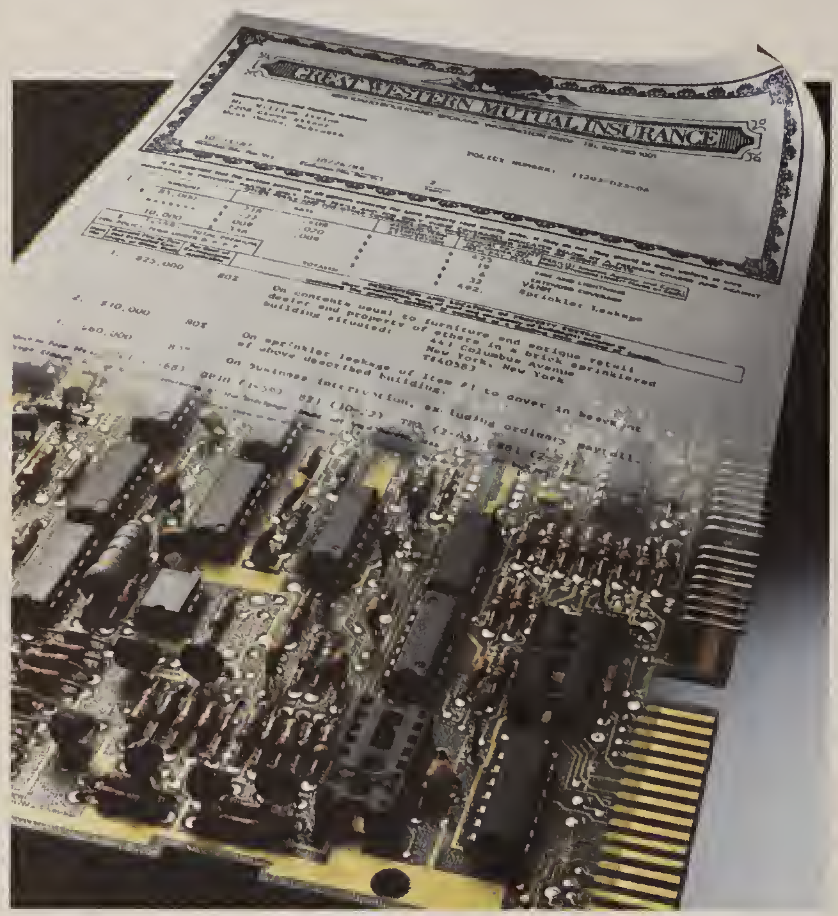
On a more serious note, Manzi said, Lotus growth will be less cyclical going forward, and return on equity will remain unchanged in the mid- to high 20s while revenue growth will remain stable at 20% to 25%.

"This is not a change from where we are today or what we've been saying about the future but [is] based on growth figures the industry [and Lotus] has historically achieved," he said.

Noting that personal computer growth is slowing worldwide and that an estimated 25% to 30% of the market consists of replacement buys, he said Lotus has built these trends into its strategy. Even so, he added, the company would be "reshaping its cost structure" over the next several months.

While Lotus is feeling increasing market share pressure, Manzi said, "it is not as significant as rumor would indicate." He dismissed a "perception" that Lotus is feeling the heat with small to medium-size companies in particular. However, Lotus is making changes to "more aggressively" address this area, he conceded.

For example, Lotus sales representatives will be assigned territories, resulting in less emphasis on individual account representation. "We're putting our resources where the business potential is" — in this case, mid-tier and smaller businesses, said Bill Drummey, Lotus' former vice-president of sales.



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NATIONAL BRIEFS

Datapoint dive

The cost of restructuring worldwide operations, **Datapoint Corp.** said, was a key factor in the firm's $82.8 million net loss for its 1990 fiscal year ended July 28. The loss was close to three times the $29.2 million net loss sustained by Datapoint in fiscal 1989. Chief Executive Officer Michael Michigami, in a prepared statement, attempted to put a positive spin on the red ink gusher: The restructuring will reduce the company's future costs, he said, noting that Datapoint also reduced its debt by $26.6 million in 1990.

■

Post garde

Nothing stays avant-garde forever — including, apparently, **Avant-Garde Computing.** Acquired last February by Sunnyvale, Calif.-based systems software house **Boole & Babbage, Inc.** as part of that firm's advance on the network management market, Avant-Garde was officially renamed Boole & Babbage Network Systems earlier this month.

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Wastes

CONTINUED FROM PAGE 93

"Keeping track of all the government's rules and regulations is a problem . . . but I'd say for the most part employers are generally aware of what our rules are. We make a very special effort to educate these people," Ratney said.

Another problem is communication between IS and those in charge of keeping track of the environmental regulations, according to Douglas McIntyre, president of Hyannis, Mass.-based Software 2000, which offers environmental systems for the IBM Application System/400 platform.

"There are quite a few companies that don't have any environmental software packages, that you would expect would have full-blown systems. Some of these companies don't even have full-time environmental people," said Al Amlani, an analyst at Cambridge, Mass.-based consulting firm Arthur D. Little, Inc.

Even those companies that have state-of-the-art IS shops do not necessarily have a full-scale environmental system, Amlani said. For example, Patrick Aurrichio, an environmental engineer for IBM's Environmental Program Group in Stamford, Conn., said that while the hardware and software vendor has been involved with "hard-core environmental activity" since the early '70s, IBM does not have a corporatewide environmental tracking system, per se.

Many of the 60 manufacturing sites throughout the world manage their environmental responsibilities on their own, he said. They use both off-the-shelf products and in-house environmental software, Aurrichio said.

"There are two companywide software programs that were developed in-house that are used in all 60 sites," he added. One is the Environmental Master Plan, a site-specific waste management form. "The other is our Incident Reporting system, which is a form that is filled out by any site that has any type of environmental incident," Aurrichio said.

McIntyre's systems *run on the IBM AS/400*

"There are quite a few large companies that have bought off-the-shelf software packages that are not practical for their specific situations," Amlani said.

"It is important for IS managers to know what they need in an environmental system and either find a product that fits their needs, or develop it on their own," he added.

If shrink-wrapped alternatives are currently in scarce supply, however, computer companies are scrambling to fill the void. For instance, although many environmental software systems are PC-based, the Software 2000 environmental series is designed to run on an IBM AS/400, McIntyre said.

The system covers three areas of records that companies are required to keep track of for various government agencies: Industrial Health, Community RTK and Hazardous Materials records, all of which are designed for easy access by multiple departments within the user company, McIntyre said.

For users seeking an easier way to keep up with the thousands of environmental rules and regulations imposed by the U.S. government, Coxton, Md.-based Environmental Communications Consultants, Inc. offers Chem-Ply, a PC-based integrated database management tool designed to help users track OSHA, EPA, the Resource Conservation and Recovery Act and the Superfund Amendments Reauthorization Act legal regulatory requirements.

The database includes a regulations management module covering all OSHA and EPA regulations that is updated every month, a list of 2,700 chemicals and their regulatory requirements and an emergency trainer module in case of accident, fire or hazardous waste accidents, according to Janice Talsky, president of the consultancy.

Know exactly what you need

What might an IS manager want to consider before investing in an environmental software system? Al Amlani, an analyst at consulting firm Arthur D. Little, Inc., offered the following suggestions:

- Make sure the software program that you choose fits the needs of your company.
- Check out the supplier's know-how. Does the supplier understand your industry?
- Beware of specific PC-based off-the-shelf environmental products. While they may seem to be what you are looking for, individual software packages are often too focused for a particular user's needs.
- Look at multiple and varying software options, and make sure your choice fits the configuration of your existing system.

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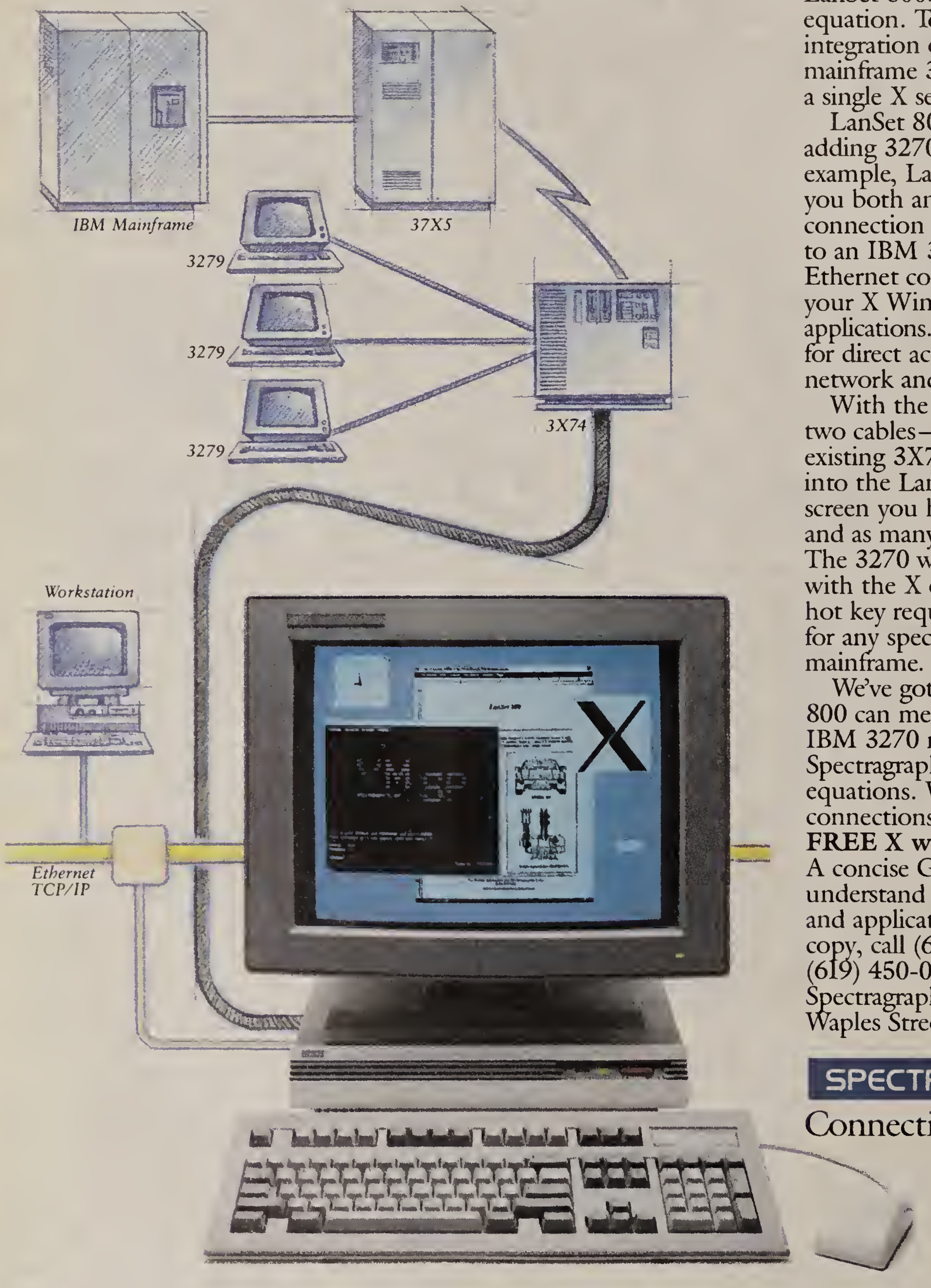

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GAO takes active tech tack

BY J. A. SAVAGE
CW STAFF

The federal government should be more like private industry in its acquisition of technology, according to the U.S. General Accounting Office (GAO). And the GAO is trying to influence government agencies in that direction with a new book of guidelines.

It was not the cost overruns of any particular agency — such as those at the Federal Aviation Administration (FAA) or the Internal Revenue Service (IRS) — that led the GAO to help guide technology acquisitions before they are actually undertaken, said Paul Bollea, a senior evaluator and an author of the booklet, "Information Technology: A Model to Help Managers Decrease Acquisition Risks."

Rather, the GAO was fueled by a desire to steer agencies in the right direction before they get mired in overwhelming projects.

For instance, the GAO has been dogging the FAA for 10 years regarding the agency's attempt to replace its obsolete systems. The project is reportedly $15 billion over its original budget and nowhere near completion.

During the last decade, an entire section of the GAO has been responsible for issuing stacks of reports to Congress on how badly the FAA is proceeding and what changes the GAO recommends. With the new booklet, the GAO hopes to circumvent such staff work in future acquisitions.

Developed from meetings with commercial executives from firms such as Merrill Lynch & Co. and Ford Motor Co., the GAO's guidelines are designed to help decrease technology acquisition risk, according to Bollea. The booklets are currently being circulated in government agencies.

One lesson the GAO learned from private industry and incorporated into its guidelines was to increase the user's importance before designing the project. "Industry leaders said that when they brought on major projects, they got users involved," Bollea said. "That way you meet users' needs first instead of the project being forced from the top down."

The guidelines also call for flexibility once a project has been defined — the lack of which has been a recurring problem with government agencies such as the FAA and the IRS, Bollea said.

For a copy of the guidelines, call the GAO at (202) 275-6241 and ask for GAO/IMTEC 8.1.6 Acquisition Model.

INTERNATIONAL BRIEFS

It ain't so, Joe

Netherlands-based **Philips Telecommunications N.V.** has denied rumors that it is looking to sell its 15% stake in a European telephone joint venture with **AT&T**. The rumor spread after a Dutch financial newspaper reported that 6% of Philips' stake would be sold to Spain's **Telefonica**, with the remaining 94% going to AT&T. Not so, Philips said.

■

Four square

As of this month, **Telecom Corp. of New Zealand Ltd.**, New Zealand's former state-owned major domestic and international telecommunications supplier, is officially in the hands of four new owners: U.S.-based **Ameritech** and **Bell Atlantic Corp.**, and New Zealand's **Richwhite Holdings Ltd.** and **Freightways Holdings Ltd.** The U.S. partners own some 90% of Telecom. As a condition of the multibillion-dollar sale to the consortium, they will reduce their stake to 49.9% during the next three years.

■

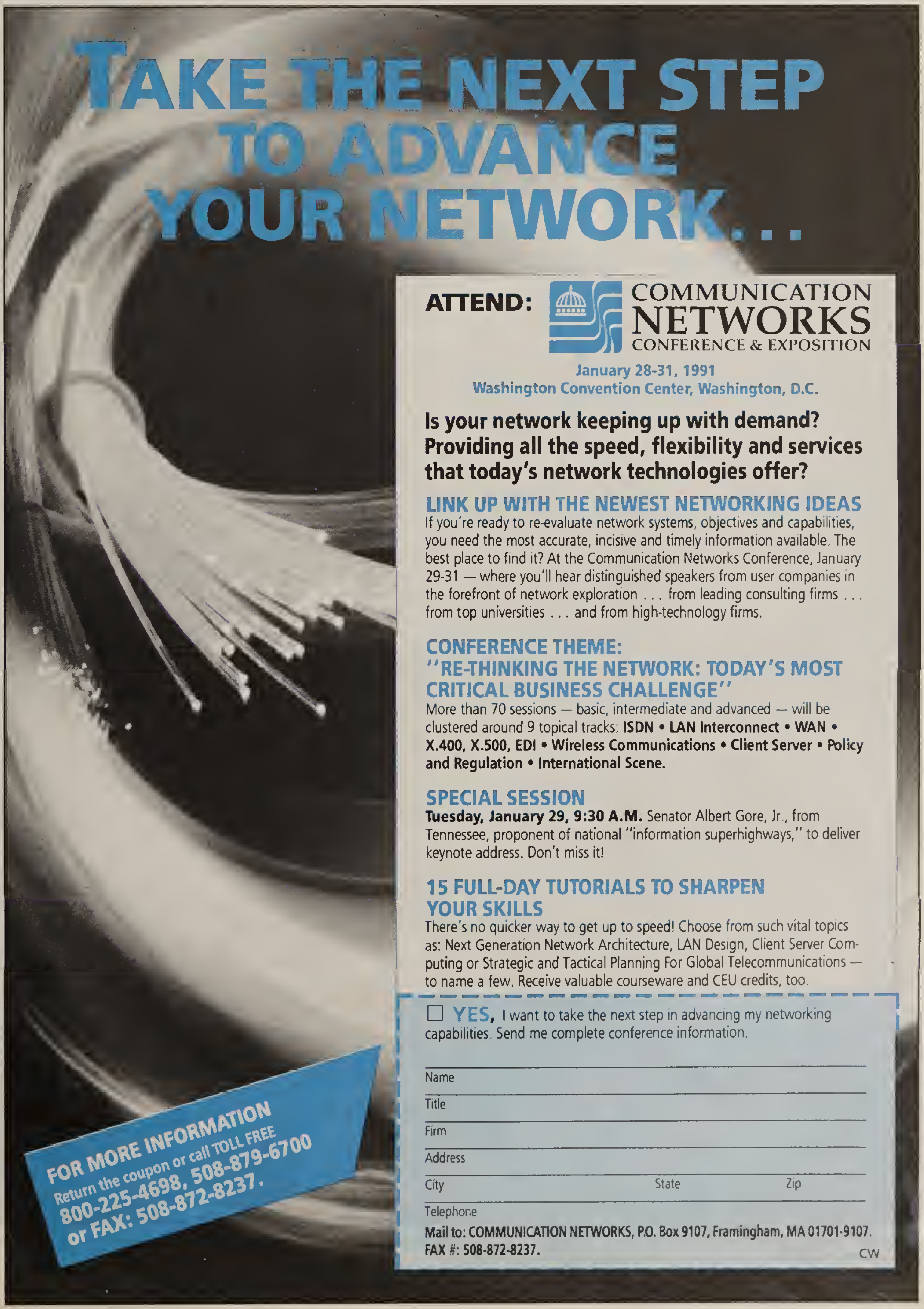
Finnish line

Information systems are no longer an exclusive large-firm preserve in Finland, said a recent study by small business association **Pienteollisuuden Keskusliitto.** During the next two years, Finnish small and medium-size firms plan to plough about 25% of their respective investment budgets into IS, with an emphasis on electronic banking, production control and warehouse management.

■

Lucky seven

The Canada Award for Business Excellence has been given for six years, but never to a software connectivity firm. However, 1990 is coming up a seven for Ottawa-based **Simware, Inc.**, which will win a medal in the invention category when the awards ceremony is held next month.



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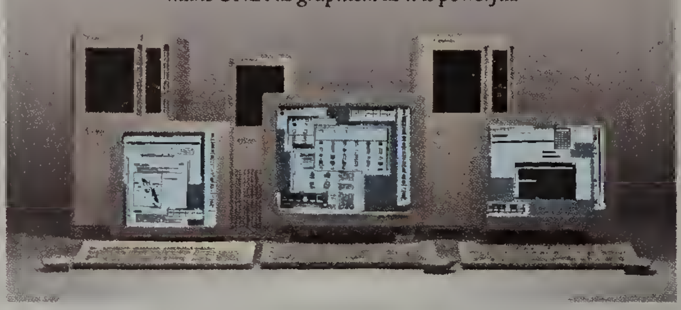

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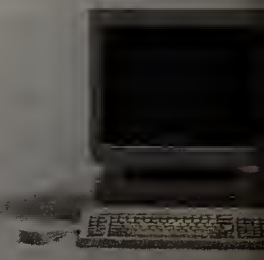

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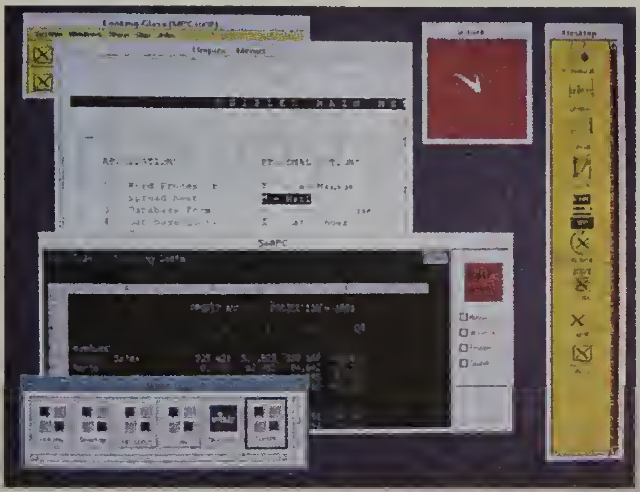

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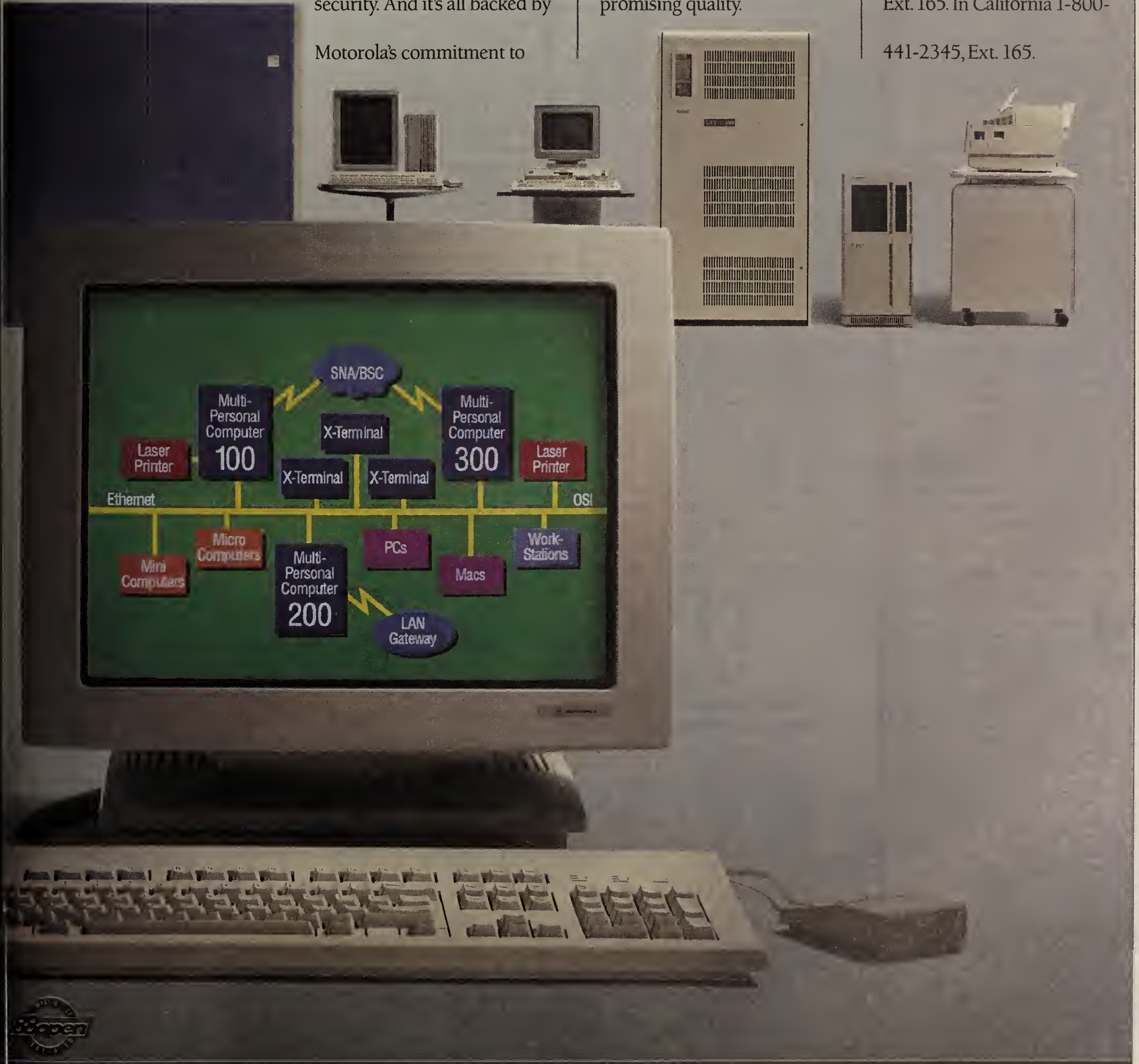

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Need for AS/400 experience boundless

BY SHERYL KAY
SPECIAL TO CW

Demand for IBM Application System/400-proficient professionals — spurred largely by conversions from IBM System/36s and System/38s — has recruiters hopping. The national installed base of AS/400s has tripled since January 1989, and many firms are feeling the impact of the placement punch.

"The AS/400's popularity happened so quickly, the demand for experienced individuals far exceeds the number in the market today," says Larry Stanczack, director at Source EDP in Chicago. In the Midwest region alone, he says, requirements for AS/400 professionals have soared 50% since the end of 1988.

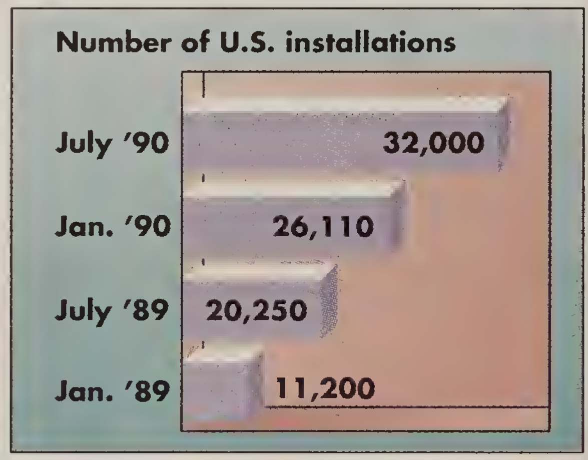
Recruiters agree that more companies are moving or contemplating a move from mainframes to midranges. While they are seeing higher conversion numbers in small to medium-size companies, larger firms are adding to the demand, too. A Coca-Cola distributing company and H.B. Fuller Co. recently converted from mainframes and are now operating multiple AS/400s, says Jim Kwapick, director of information systems recruiting at Robert Half International, Inc. in Minneapolis.

Other causes for the boom: Companies want the higher level of distributed processing and stand-alone divisional processing that the AS/400 provides. Also, the AS/400 is more flexible and boasts increased capacity, according to Stanczack. "It's the kind of machine whereby many of these small to mid-size companies can just buy the canned software, so they don't have to have the extensive in-house development effort," Kwapick says.

This is good news for those with experience. AS/400 professionals are in such demand that firms are paying highly competitive salaries. Nationally, Stanczack reports that programmer/analysts with three years of overall IS experience (two on the AS/400) may command salaries in the range of $36,000 to $40,000. For senior analysts with 10 years of experience, the salaries climb to about $45,000 to $55,000. For individuals who also have supervisory experience, salaries could reach more than $60,000, he adds.

Up, up and away

Application System/400 installations have tripled in 1 1/2 years, boosting demand for proficient professionals



Source: Computer Intelligence CW Chart: Chuck Fletcher

Some might think that the logical solution to satisfy the demand would be for companies to train their own staffs on the AS/400 system. However, it doesn't always work that way. "Typically, small to mid-size firms don't have sophisticated training functions. They usually have pretty small staffs, so they don't have the liberty to have any downtime for training," Kwapick says. But when employers look outside of the firm for experienced professionals, the numbers are slim. This, recruiters say, is because training for the AS/400 can get tricky.

For example, the architecture of the operating system is brand-new and is different than any of its predecessors, although it is similar to System/38s. One learning curve for System/36 people trying to move onto the AS/400 is its job control language. The AS/400 uses CL, while a System/36 requires OCL, and the differences are significant, says Chris Miller, a programmer/analyst at Concord Management Systems, Inc. in Tampa, Fla.

Anyone with a solid foundation in data processing could easily be trained on the AS/400, according to Miller. However, he suggests that interested professionals would do well to learn the RPG programming language rather than Cobol, C, Fortran or Basic because approximately 70% of AS/400 shops are using some form of RPG. "It's ironic because the RPG skills in the past didn't seem to be so marketable, but they sure are now," Kwapick says.

Miller reports, however, that "learning the AS/400 is not nearly as difficult as finding an employer who will offer to train you." Companies want AS/400 proficiency now, not three months from now, Kwapick explains.

Bob Ashman, vice-president at Baltimore-based First National Bank of Maryland, says one problem he's run into is that college students aren't getting a strong enough education in low- to midrange computers. "Upon graduation, their perception is that most jobs will be Cobol, mainframe-oriented," he says.

Those with extensive experience on the System/38 find the AS/400 easy to learn. "It looked strange to me for about one week," says systems analyst Rebecca Loesche at Reiman Publications, Inc. in Greendale, Wis. "I teamed up with one other co-worker, and after going through the manual, I had no problems."

> "LEARNING THE AS/400 is not nearly as difficult as finding an employer who will offer to train you."
>
> CHRIS MILLER
> CONCORD MANAGEMENT SYSTEMS

Loesche says that the AS/400 has provided her with a great deal of flexibility. In the past, many commands on the System/38 had to be customized specifically for her company. On the AS/400, these customized commands are already incorporated into the system. "It's very menu-driven, so it's much easier to move objects around," she says.

Although the demand will peak sooner or later, AS/400 whizzes should enjoy the boom while it lasts. "From a job placement standpoint," Kwapick concludes, "I wouldn't say it's an avalanche, but it's close."

Kay is a business consultant and free-lance writer specializing in emerging technologies and human resources.

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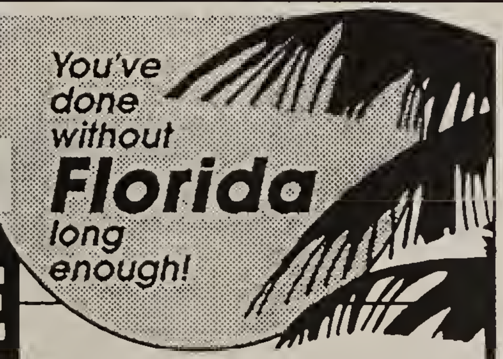

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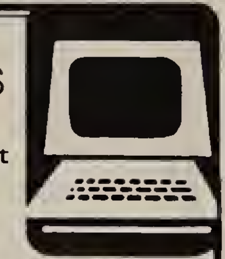

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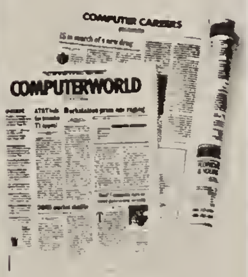

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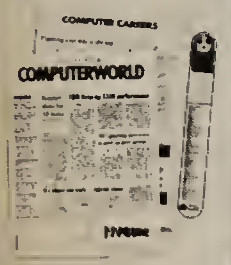

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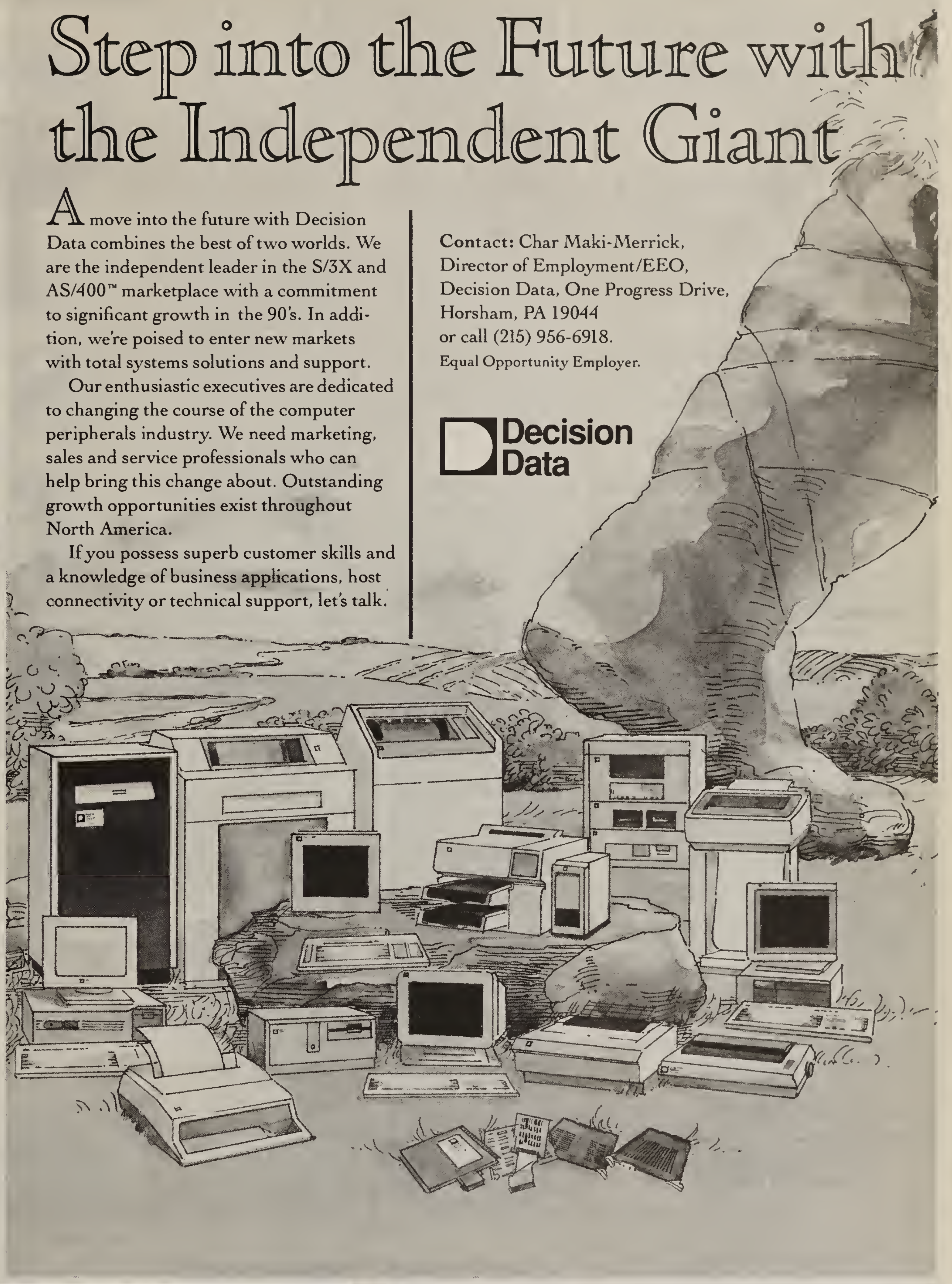

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MARKETPLACE

Multimedia offers managers multiple business solutions

BY JESSICA KEYES
SPECIAL TO CW

And you thought multimedia was just for the classroom.

Not so anymore. Multimedia — the ability to use desktop computer technology to blend basic tools such as graphics, animation, audio and video — is creeping into more places than you would imagine.

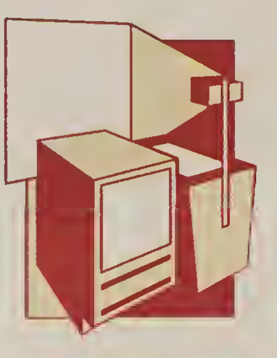
For example, in the World Financial Center in New York, multimedia kiosks are used to direct visitors around the large complex of buildings, shops and sights. These kiosks contain specialized hardware devices that permit the integration of video, graphics and audio with a touch-screen input device.

The majority of multimedia applications used to be directed toward corporate training and marketing presentations. Gradually, however, this technology has become popular with grassroots business application managers.

The financial quote service Infotechnology, Inc., which owns "Financial Network News" in New York, made a major alteration to the rather humdrum text-based quote service. Having ported the application to a more advanced workstation, the service is now able to merge live reporting from one of the financial news networks. This multimedia approach enables the stock analyst to watch the news and research stock information at the same time — on one piece of equipment.

Multimedia is not for the faint of heart. To develop a professional-quality system requires mastery of the many components. A plan to integrate video, audio, text and animation requires a development team to first master each of these separate components completely.

It is also not for the faint of wallet. A manager who follows an IBM recommendation to the letter can expect a price that runs to five digits. And there's still the cost of the video and audio recording equipment. A minimum configuration on the video side — the more expensive of the two — would be a camcorder, VCR and an editing device. If the manager finds a bargain, the recording equipment should cost no more than $2,000.



On top of all this is the animation and graphics software — sometimes called presentation software and averaging about $500 — and the multimedia software itself. Interestingly, the multimedia software may be the least expensive portion of the system, averaging $495 for the newer entries on the market, such as IBM's Audio Visual Connection.

Be forewarned: There are wide swings in prices, so research carefully. To assist the novice multimedia developer in selecting and putting together a system, the following checklist can be used to ensure that all the components are accounted for:

- **What media needs to be integrated?** The choices are many. The most common are voice, music, still image, full-motion video, graphics, text and user input. Be aware that not all multimedia tools integrate all of the media listed. Developers need to match their requirements to the multimedia tool set.
- **Where will all of these sound, video, graphics and text files be stored?** It's becoming more common today to find multimedia systems dependent on compact disc/read-only memory for access to the thousands of images necessary for creating some larger scale systems. If this is the path you've chosen to take, you must ensure that the multimedia software can access this input device.
- **Do you have the necessary audio and/or video recording equipment?** Audio recording has been around a long time and should be available to everyone in the form of a tape recorder. Make sure you have staff members available with the diction and presence necessary to carry off development of the system's audio track. The same holds true for video.
- **Do you have the proper personal computer configuration to handle the load?** It would be foolhardy to attempt multimedia on an IBM Personal Computer XT, but some of the smaller vendors let you run multimedia applications on as little as 1M byte of random-access memory. But remember, there is a correlation between hardware configuration and speed.
- **Do you have the proper animation and graphics software?** Make sure your software creates files in the format necessary for integration into the multimedia tool. Many users already have these software packages.
- **Does your staff know how to use these tools?** The manager might be faced with the problem of staff members not only having to figure out how to connect all of this equipment together — somewhat like hooking up your VCR, TV and cable box, and we all know how much fun that was — but also having to learn a cadre of new software packages.

With multimedia sinking into more organizational cracks than just training, it's best to know what you're getting into before you make long-term purchasing decisions.

Keyes is president of New Art, Inc., a management and computer consulting firm in New York.

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XT Model 089	$675	$825	$475
AT Model 099	$975	$1,375	$850
AT Model 239	$1,025	$1,325	$700
AT Model 339	$1,175	$1,400	$900
PS/2 Model 50Z	$1,550	$1,650	$1,425
PS/2 Model 60	$1,850	$2,200	$1,600
PS/2 Model 70P	$3,550	$3,700	$3,175
Compaq Portable II	$975	$1,150	$875
Portable 286	$1,275	$1,450	$1,100
SLT-286	$2,500	$2,825	$1,700
Portable 386	$3,000	$3,450	$2,950
LTE 286	$2,100	$2,525	$2,000
Deskpro 286	$1,375	$1,400	$1,200
Deskpro 386/20	$2,800	$3,100	$2,400
Apple Macintosh 512	$375	$775	$275
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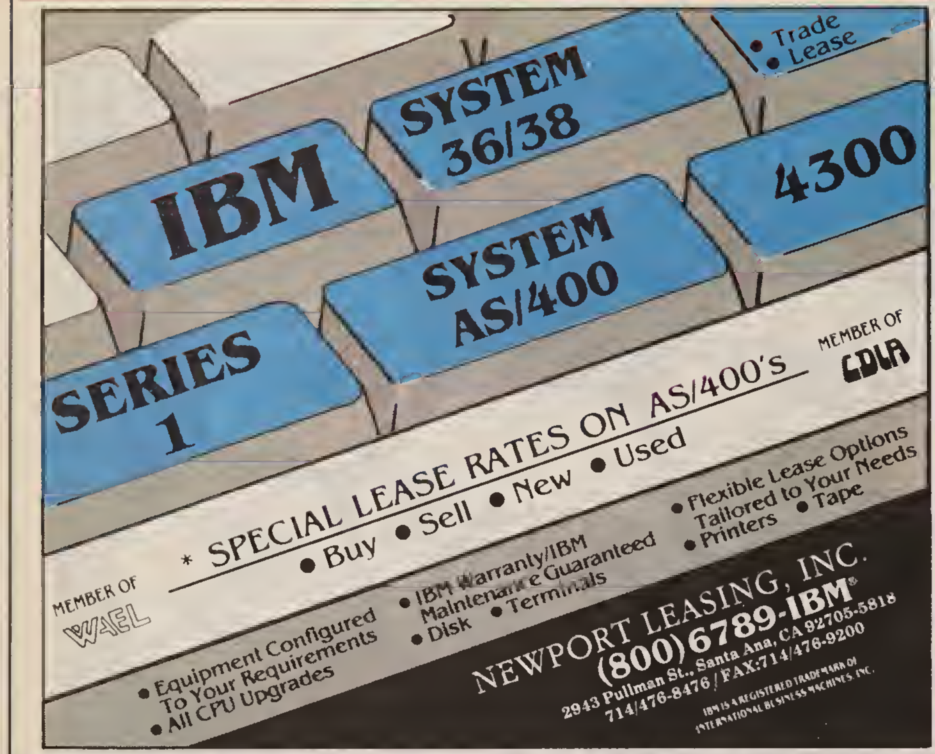

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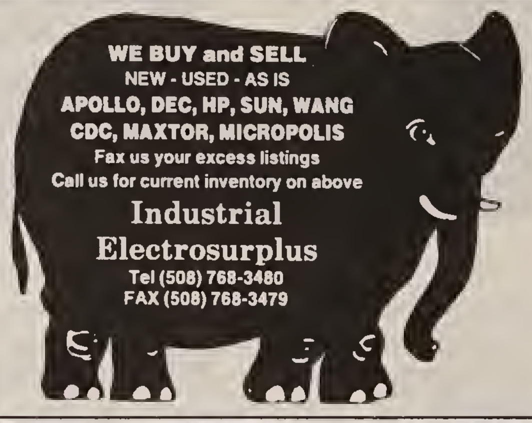

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Systems Managers, Systems Analyst	79,913
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Programmers, Methods Analysts	120,889
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Manufacturers' Sales Representatives, Sales & Marketing Management	29,574
Consulting Management	20,841
Medical/Legal/Accounting Management, Educators, Journalists, Librarians & Students	125,016
Other	12,198
Total	**612,703**

*Source: Audit Bureau of Circulations Supplemental Data Report, May 25, 1987.

To place your ad, call John Corrigan, Vice President/Classified Advertising, at **800/343-6474 (in MA, 508/879-0700).**

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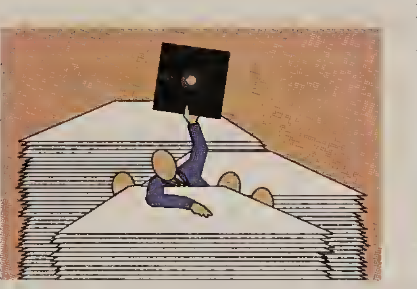
Beating the paper glut

Authoring systems can replace hard copy in many situations

BY NANCY MUELLER
SPECIAL TO CW

Computers were supposed to save us from the ever-increasing mounds of paper and lead the way to the paperless office. Instead, they've somehow increased the piles. What happened?

The many breakthroughs in computers and telecommunications technology have provided us not only with easier, quicker methods of storing information but also with the ability to access information from around the world.



Of course, information provides the building blocks for creating more information, causing an ongoing multiplying effect.

The cost of paper isn't the problem; paper is cheap. It's the cost of storage space and the labor involved: the filing, accessing and updating.

One way to put a lid on paper documentation and the expense of handling it is through nontraditional uses of computer-based training authoring systems software.

Authoring systems can be used in areas other than training. They can be used to reduce paper overload and increase staff efficiency and effectiveness.

For instance, authoring systems can be used to generate disk-based policies, procedures, guidelines and standards.

Although employing electronic policies is not a new concept, many organizations still have not taken this approach. Authoring systems can also create electronic presentations, whether instructional, informational or promotional in nature.

Nontraditional applications of authoring systems are gaining momentum in organizations as the advantages of such nontraditional uses are becoming better known.

One of the pioneer groups in using authoring systems in these ways is Informatics Group, Inc. Mike Ganci, president of Informatics, said that the use of programs such as its ACT III is expanding in nontraditional applications. "Managers are finding out that disk-based presentations are highly cost-effective ways to disseminate information, that they can be created and modified quickly and that unlike passive paper-based information, the interaction of the disk causes higher information retention," he said.

Some nontraditional users of authoring systems include the following:

- Authorware, Inc. produced a prototype interactive magazine, called *Authorware's Macworld Interactive*, for *Macworld*.
- The computer-aided publications department in the Peripheral Products Division at NCR Corp. created an on-line writer's handbook.
- Informatics developed on-line procurement procedures for IBM's Marketing and Services Communications Group.
- Metamedia Systems, Inc. produced a "point of information" system, called Infopost, for the U.S. Postal Service.
- Micro Training Associates, Inc. developed trade-show demonstrations and on-line documentation for AT&T.
- Paragon Technologies, Inc. developed both a feature-oriented product demonstration intended for mass mailings and a trade-show demonstration.

A variety of authoring systems were used in the above applications: Informatics' ACT III, Authorware's Authorware Professional, Applied Learning's The Educator, Cognetics Corp.'s Hyperties hypertext software, On-line Computer Systems, Inc.'s Oasys, Computer Teaching Corp.'s Tencore Producer and Alan Communication's Quest.

What does all this mean to information systems trainers? The basic problem they'll face is not new.

Discrepancies continue to exist between the availability of technology and the use of technology because of a lack of knowledge among potential users regarding what is available and how to effectively apply it.

Trainers familiar with authoring systems should conduct classes on how it can be used and how to get the most out of it.

They could also demonstrate how to develop disk-based policies, procedures, standards and guidelines, highlighting the many features that such software has to offer from both developer and viewer perspectives.

Think of computer-based training authoring systems as another option — another tool for developing presentations.

> ONE WAY TO put a lid on paper documentation and the expense of handling it is through nontraditional uses of computer-based training authoring systems software.

Choosing a presentation method or medium is like performing a feasibility study. You must analyze your needs, develop alternative solutions, then choose the best solution for the situation, taking all relevant factors into consideration.

Organizations cannot survive in today's marketplace on tradition and rigidity, not in this era of fierce competition and rapidly advancing technology. They must anticipate and quickly respond to all types of changing environmental demands, regardless of the source, if they are to continue offering competitive products, prices and service.

Mueller is an IS technical adviser and liaison to the Graduate College, Bowling Green State University, Bowling Green, Ohio.

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What's more *Computerworld's* Training Pages lead buyers to your ad with a weekly Training editorial feature that anchors the section and your ad. Whether it's topics like "Unraveling SQL for MIS pros," or "Finessing the training contract," *Computerworld's* Training Pages deliver pertinent, advice-oriented editorial to *Computerworld's* readers every week.

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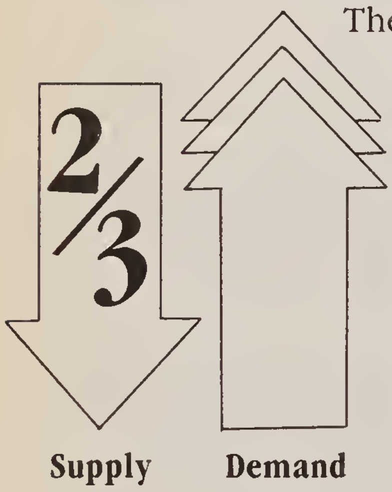
A few important tips on recruiting computer professionals

Finding computer talent isn't as easy as it used to be. In fact, there was a time when you'd just run an ad in the local newspaper and you could make a hire without waiting too long or spending too much.

But times have changed. And like so many facets of today's business, so has the effectiveness of traditional recruiting methods.

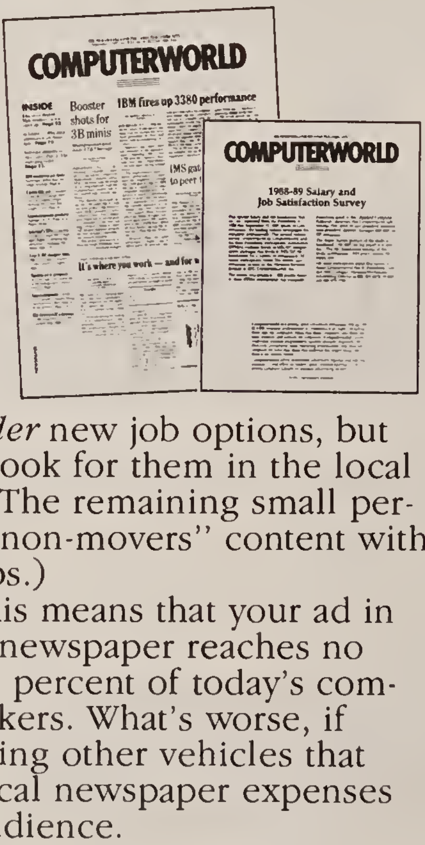
What's more, many of today's recruiters *don't use* today's most efficient methods — methods that save time and money for some widely unknown reasons.

The supply of qualified professionals isn't meeting demand



The American Council on Education reports that the number of college students choosing computer careers is down two-thirds since 1982. To make matters worse, there are more computers in today's business that require the skills of this shrinking market than ever before. And while you may never consider the company next door your competitor, it likely *is* competing for the same computer talent today. The result is a classic supply/demand problem that isn't changing for the better -and that's sure to make your recruiting tougher in the '90s.

Ads in local papers don't reach your major hiring market anymore


COMPUTERWORLD
IBM fires up 3380 performance
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1988-89 Salary and Job Satisfaction Survey

That's because they generally reach "active" job seekers — those who actively seek out the local newspaper to find jobs — and who a recent *Computerworld* job satisfaction survey found to represent 2 in 10 of today's computer professionals. The study also found that 7 in 10 of today's computer professionals are "passive" job seekers — those who would *consider* new job options, but likely never look for them in the local newspaper. (The remaining small percentage are "non-movers" content with long-term jobs.)

In short, this means that your ad in today's local newspaper reaches no more than 20 percent of today's computer job seekers. What's worse, if you're not using other vehicles that reach far more job seekers, your local newspaper expenses are as inefficient as their limited audience.

For every 10 of today's computer job seekers . . .
2 are Active ▢▢
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1 is a Non-mover ▢

More job seekers see your ad in Computerworld than in any other newspaper — Sunday, daily, or trade

That's because *Computerworld* reaches over 612,000 qualified computer professionals every week — the largest audience of its kind, and one that's rich with passive and active job seekers.

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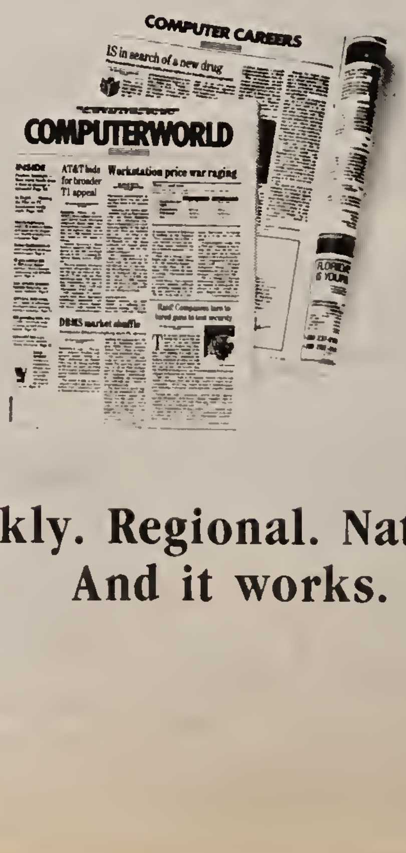
Computerworld leads candidates to your ad

Just look at this week's Computer Careers section. You'll find a career editorial topic that will stir the interest of virtually any computer job seeker — passive *or* active. It's just one of countless reasons *Computerworld* is America's newspaper of choice on computing. No matter how much the times change.

And while times may change, some things won't. Whether you *use* computers, *make* computers, or sell products and services *for* computers, *Computerworld* is still your major source of news today. And your major source of computer professionals tomorrow.

For more recruiting tips, call John Corrigan, Vice President/Classified Advertising, at 800/343-6474 (in MA, 508/879-0700).



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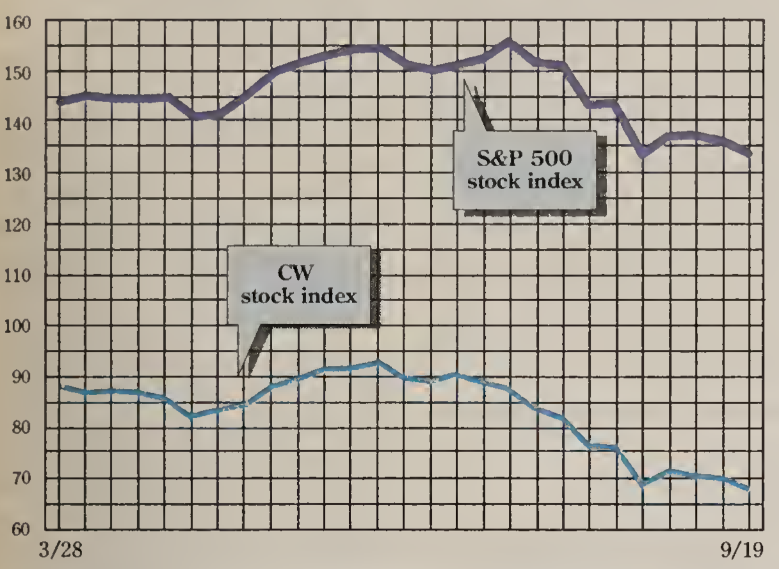
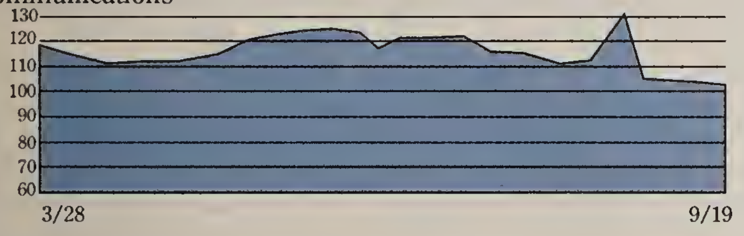
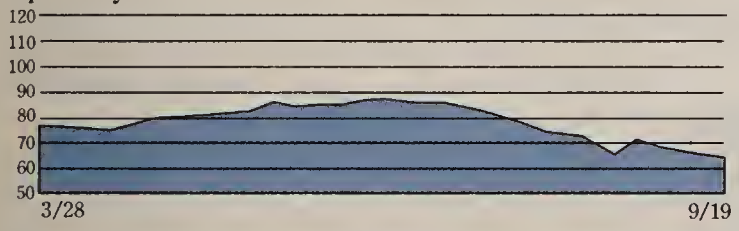


Indexes	*Last Week*	*This Week*
Communications	104.6	**103.9**
Computer Systems	67.8	**65.7**
Software & DP Services	102.4	**97.8**
Semiconductors	45.4	**44.3**
Peripherals & Subsystems	75.6	**73.5**
Leasing Companies	56.8	**54.4**
Composite Index	70.0	**68.0**
S&P 500 Index	136.3	**133.8**

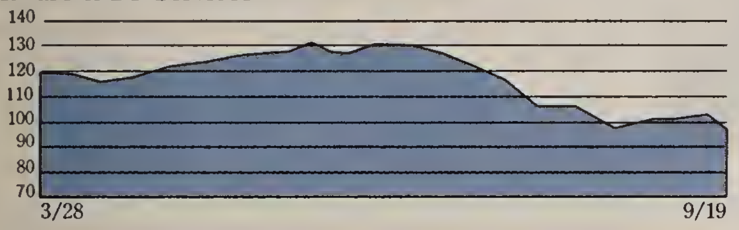
Communications



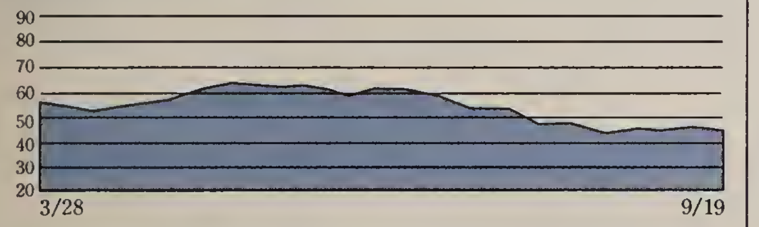
Computer Systems



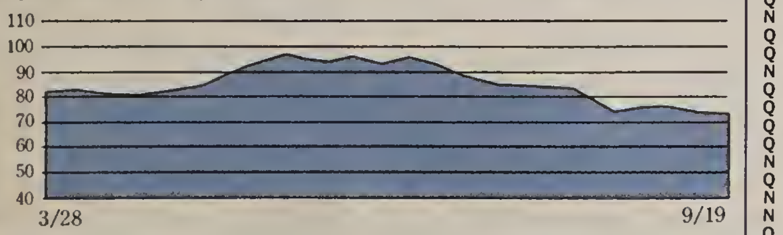
Software & DP Services



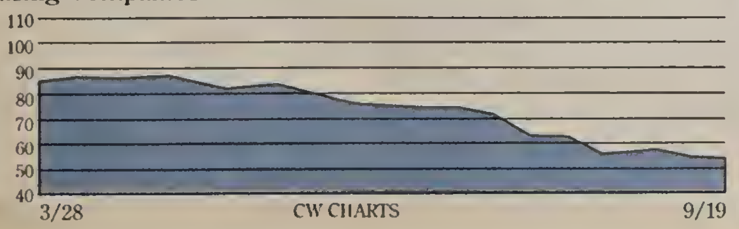
Semiconductors



Peripherals & Subsystems



Leasing Companies



CW CHARTS

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPT. 19, 1990

EXCH		52-WEEK RANGE		PRICE CLOSE SEPT. 19, 1990	WEEK NET CHNGE	WEEK PCT CHNGE
	Communications and Network Services					
N	AMERICAN INFO TECHS CORP	68	53	60.375	4.1	7.3
Q	ANDREW CORP	26	16	18	0.0	0.0
Q	ARTEL COMM CORP	10	3	3.125	0.1	4.2
N	AT&T	47	30	30.875	0.3	0.8
Q	AVANTEK INC	6	2	2.563	-0.1	-2.4
N	AYDIN CORP	21	11	10.75	0.0	0.0
N	BELL ATLANTIC CORP	57	40	45.375	1.9	4.3
N	BELLSOUTH CORP	59	49	51.375	1.1	2.2
Q	COMPRESSION LABS INC	16	7	13.25	0.0	0.0
Q	CONTEL CORP	37	23	30	-0.4	-1.2
Q	DATA SWITCH CORP	4	2	3.75	-0.1	-3.2
Q	DIGITAL COMM ASSOC	27	15	15.875	0.0	0.0
Q	DYNATECH CORP	20	15	15.5	-0.6	-3.9
Q	FIBRONICS INTNL INC	13	5	8.625	-0.1	-1.4
Q	GANDALF TECHNOLOGIES	6	2	3	0.1	4.3
N	GENERAL DATACOMM INDS	6	2	2.375	-0.1	-5.0
N	GTE CORP	36	24	25.25	-0.3	-1.0
Q	INFOTRON SYS CORP	10	2	2.5	-0.3	-9.1
N	ITT CORP	64	50	50.5	-1.9	-3.6
N	M A COM INC	7	3	4.125	0.1	3.1
Q	MCI COMMUNICATIONS CORP	49	31	31.875	-2.0	-5.9
N	NETWORK EQUIP TECH INC	34	5	6.375	0.9	15.9
Q	NETWORK SYS CORP	15	7	8.75	-0.3	-2.8
N	NORTHERN TELECOM LTD	30	20	23.375	0.3	1.1
Q	NOVELL INC	29	12	26.375	-0.1	-0.5
N	NYNEX CORP	92	68	71.75	2.5	3.6
N	PACIFIC TELESIS GROUP	52	36	41.625	0.4	0.9
A	PENRIL CORP	9	5	6.125	-0.6	-9.3
N	SCIENTIFIC ATLANTA INC	29	15	14.75	-2.3	-13.2
N	SOUTHWESTERN BELL CORP	65	47	48.75	1.1	2.4
Q	3 COM CORP	19	7	7.75	-0.8	-8.8
N	U S WEST INC	41	32	34.5	-0.4	-1.1
	Computer Systems					
Q	ALLIANT COMPUTER SYS	9	2	2.625	-0.1	-4.5
Q	ALPHA MICROSYSTEMS	7	2	1.875	0.4	25.0
A	AMDAHL CORP	19	11	12.125	-0.4	-3.0
Q	APPLE COMPUTER INC	50	32	32.5	-1.5	-4.4
Q	AST RESH INC	26	8	19.625	0.6	3.3
N	BOLT BERANEK & NEWMAN	8	4	5.5	-0.1	-2.2
N	COMPAQ COMPUTER CORP	68	37	44.375	0.1	0.3
N	COMMODORE INTNL	12	5	5	-0.5	-9.1
Q	COMPUTER AUTOMATION INC	6	0	0.282	-0.2	-43.6
N	CONTROL DATA CORP	22	11	10.625	-2.4	-18.3
N	CRAY RESH INC	51	31	34.75	-0.5	-1.4
N	DATA GEN CORP	16	5	6.75	1.3	22.7
N	DATAPOINT CORP	6	1	1	-0.3	-20.0
Q	DELL COMPUTER CORP	14	5	10.875	-0.9	-7.4
N	DIGITAL EQUIP CORP	98	54	55.625	-6.0	-9.7
N	FLOATING POINT SYS INC	4	0	1.5	0.1	9.1
N	HARRIS CORP	40	24	24.625	-0.1	-0.5
N	HEWLETT PACKARD CO	52	31	33.5	-1.6	-4.6
N	HONEYWELL INC	112	73	92.125	-2.4	-2.5
N	IBM	123	93	108.375	0.5	0.5
Q	INFORMATION INTL INC	15	10	10	-0.5	-4.8
Q	IPL SYS INC	14	5	9.5	0.3	2.7
N	MAI BASIC FOUR INC	6	2	1.938	-0.1	-3.1
N	MATSUSHITA ELEC INDL LTD	172	117	120.75	-7.5	-5.8
Q	MENTOR GRAPHICS CORP	26	11	12.5	0.0	0.0
N	NBI INC	2	0	0.172	0.0	-8.5
N	NCR CORP	72	55	58.625	-1.4	-2.3
Q	PYRAMID TECHNOLOGY	36	13	18.375	-1.1	-5.8
Q	SEQUENT COMP SYS INC	34	15	22.75	0.3	1.1
Q	SUN MICROSYSTEM INC	37	15	29.375	1.0	3.5
Q	SYMBOLICS INC	2	0	0.438	0.0	0.0
N	TANDEM COMPUTERS INC	30	11	11.5	-0.1	-1.1
N	TANDY CORP	48	25	26.125	0.4	1.5
N	ULTIMATE CORP	10	5	5	-0.4	-7.0
N	UNISYS CORP	20	7	7	-1.4	-16.4
A	WANG LABS INC	6	3	3.375	-0.3	-6.9
	Software & DP Services					
Q	AMERICAN MGMT SYS INC	20	11	13	-0.3	-1.9
Q	AMERICAN SOFTWARE INC	18	8	8.875	-0.5	-5.3
N	ANACOMP INC	6	2	2.25	-0.1	-5.3
Q	ANALYSTS INTL CORP	24	12	12.25	-5.3	-30.0
Q	ASHTON TATE	15	7	7.75	-0.1	-1.6
Q	ASK COMPUTER SYS INC	10	7	7.625	-0.3	-3.2
N	AUTO DATA PROCESSING	60	44	47.875	-1.5	-3.0
Q	AUTODESK INC	60	33	45.75	-0.8	-1.6
Q	BMC SOFTWARE INC	30	14	23.75	0.1	0.5
N	BUSINESSLAND INC	14	2	2.375	-0.3	-9.5
Q	COGNOS INC	10	4	7.625	0.0	0.0
N	COMPUTER ASSOC INTL INC	17	6	6	-0.6	-9.4
Q	COMPUTER HORIZONS CORP	17	7	14.5	-1.0	-6.5
N	COMPUTER SCIENCES CORP	59	37	37.875	-1.9	-4.7
N	COMPUTER TASK GROUP INC	12	8	8.5	-0.6	-6.8
Q	COMSHARE INC	25	16	16	-2.0	-11.1
Q	CORPORATE SOFTWARE	16	8	11.5	-0.5	-4.2
N	GENERAL MTRS (CLS E)	38	24	34.75	1.5	4.5
Q	GOAL SYSTEMS INTL	18	10	11.25	-0.3	-2.2
Q	HOGAN SYS INC	7	2	2.75	-0.5	-15.4
Q	INFORMIX CORP	18	6	5.875	-1.1	-16.1
Q	INTELLICORP INC	8	4	4	-0.4	-8.6
Q	LEGENT CORP	32	18	20	-0.3	-1.2
Q	LOTUS DEV CORP	39	14	14.75	-2.3	-13.2
Q	MICROSOFT CORP	81	31	62	4.6	8.1
Q	NATIONAL DATA CORP	35	8	10.375	-0.1	-1.2
N	ON LINE SOFTWARE INTL INC	11	6	6	0.0	0.0
Q	ORACLE SYS CORP	188	7	7.25	-1.0	-12.1
N	PANSOPHIC SYS INC	19	10	11.375	0.0	0.0
Q	PHOENIX TECHNOLOGIES INC	5	2	2.5	-0.5	-16.7
N	POLICY MGMT SYS CORP	43	30	37.75	0.5	1.3
Q	PROGRAMMING & SYS INC	25	14	15.375	-0.6	-3.9
Q	RELATIONAL TECH INC	10	3	9.125	0.1	1.4
N	REYNOLDS & REYNOLDS CO	27	14	14.125	-0.8	-5.0
Q	SAGE SOFTWARE INC	16	8	10.125	-0.3	-2.4
Q	SEI CORP	22	15	16.375	-0.6	-3.7
Q	SHARED MED SYS CORP	17	12	14	-0.9	-5.9
Q	SOFTWARE PUBG CORP	28	14	22	-2.0	-8.3
N	STERLING SOFTWARE INC	11	7	6.875	-0.3	-3.5
Q	SUNGARD DATA SYS INC	26	15	16.25	-2.3	-12.2
N	SYSTEM CENTER INC	25	8	8.125	-0.8	-8.5
N	SYS. SOFT INC	29	16	20	-0.8	-3.6
Q	WORDSTAR	2	1	1	0.3	33.3
	Semiconductors					
N	ADV MICRO DEVICES INC	11	5	5.75	-0.1	-2.1
N	ANALOG DEVICES INC	10	6	6.375	0.0	0.0
Q	ANALOGIC CORP	11	8	9.75	0.1	1.3
Q	CHIPS & TECHNOLOGIES INC	26	10	11	-0.4	-3.3
Q	INTEL CORP	52	30	33.875	1.1	3.4
Q	MICRON TECHNOLOGY INC	16	7	8.125	-0.9	-9.7
N	MOTOROLA INC	88	53	61	0.1	0.2
N	NATL SEMICONDUCTOR	9	4	4.75	-0.3	-5.0
N	TEXAS INSTRS INC	44	25	28.625	0.1	0.4
A	WESTERN DIGITAL CORP	15	6	7.625	-1.0	-11.6
	Peripherals					
Q	ALLOY COMP	2	0	0.438	0.0	0.0
N	AM INTL INC	6	1	1.375	-0.3	-15.4
Q	AUTO TROL TECH CORP	5	2	2.25	-0.1	-5.3
Q	BANCTEC INC	24	13	15.5	-0.3	-1.6
A	COGNITRONICS CORP	8	3	4.875	0.1	2.6
Q	CONNER PERIPHERALS	31	11	21.625	-0.6	-2.8
A	DATARAM CORP	22	8	11.75	-0.6	-5.1
N	EASTMAN KODAK CO	49	36	42.125	0.6	1.5
N	E M C CORP MASS	7	3	6	0.5	9.1
Q	EMULEX CORP	9	4	6.5	0.6	10.6
Q	EVANS & SUTHERLAND	35	18	25.25	0.3	1.0
Q	ICOT CORP	2	1	0.625	-0.3	-28.6
Q	INTERLEAF INC	8	3	3.125	0.0	0.0
Q	IOMEGA CORP	6	3	5	0.2	3.9
Q	MASSTOR SYS CORP	3	1	0.75	-0.1	-7.7
Q	MAXTOR CORP	17	6	6.25	-1.1	-15.3
Q	MICROPOLIS CORP	10	3	5	-0.1	-2.4
N	MINNESOTA MNG & MFG CO	91	68	79.5	0.9	1.1
Q	PERSONAL COMP PRODUCTS INC	5	4	4	0.3	6.7
Q	PRINTRONIX INC	15	9	9.75	0.0	0.0
N	QMS INC	21	9	12.625	-1.3	-9.0
Q	QUANTUM CORP	26	9	17.375	-0.3	-1.4
N	RECOGNITION EQUIP INC	8	4	5.125	0.0	0.0
Q	REXON INC	10	4	4.75	0.1	1.3
Q	SEAGATE TECHNOLOGY	20	8	8.25	-0.3	-2.9
N	STORAGE TECH CORP	35	11	16.25	-2.6	-13.9
Q	TANDON CORP	4	1	2	0.0	0.0
N	TEKTRONIX INC	20	12	14	-0.5	-3.4
Q	TELEVIDEO SYS INC	1	0	0.281	0.0	0.0
N	XEROX CORP	67	38	37.75	-1.4	-3.5
	Leasing Companies					
N	CAPITAL ASSOC INTNL INC	7	1	1.25	0.1	5.2
N	COMDISCO INC	34	15	16.75	-0.8	-4.3
Q	LDI CORPORATION	18	12	12.5	-0.5	-3.8
Q	PHOENIX AMERN INC	5	3	3.5	0.0	0.0
Q	SELECTERM INC	8	3	3.313	0.1	1.9

Fall-tering

Autumn's approach does not slow tech stocks' summer slide

Technology stocks fell faster than dry leaves off an autumn oak last week, and Digital Equipment Corp. hit the ground hard. DEC fell to 53¾ Thursday, its lowest closing price in five years, after losing 2⅝ points last week.

IBM stood strong, however, raking in 3½ points to close at 107⅞, making it a standout among last week's sinkers.

After deciding not to decide between the two major factions in the Unix standards debate and then announcing that its new operating system would be unavailable until 1991, Apple Computer, Inc. sagged 2⅜ points to 31⅝.

Sellers stomped Adobe Systems, Inc. down 4⅜ points to 22½. Oracle Systems Corp. continued its long, slow slide downward, easing ½ of a point to close at 7. Oracle has lost more than 49%, or 6⅝ points, of its share price in the past four weeks. Other software firms also felt an early frost: Novell, Inc. slipped 1 point to 25 and Lotus Development Corp. fell 1¼ points to 14¾. Microsoft Corp. remained steady at 59¾ points after signing a software licensing agreement with IBM.

NCR Corp. said it plans to build new machines using Intel Corp. microprocessors, which boosted Intel stock up ⅜ of a point to 33. NCR tumbled, however, 1½ points by Thursday to close at 58. Motorola, Inc. declined 2⅞ points to 60⅛ Thursday, hovering near its 52-week low. National Semiconductor Corp. gave up ¼ of a point to 4½. Quarterly financials from the chip maker showed revenue up more than 11% from revenue for the same period a year ago.

Sun Microsystems, Inc. was a bright spot in an otherwise gloomy technology arena, edging up ⅛ of a point to 28½. Also ahead of the game was United Telecom, Inc., which gained ½ of a point to close at 25¼.

KIM S. NASH

Oracle

FROM PAGE 1

month to 25%. That will necessitate drastic cutbacks in spending to reflect the lowered expectations.

Oracle Chief Executive Officer Larry Ellison said in a prepared statement that he will sweep away two layers of sales management, "reducing the number of sales managers while increasing the number of sales representatives."

Oracle insiders, including current and former executives and employees, have described a harrowing summer in which all the rules of Oracle's win-at-all-costs marketing strategy were called into question — and no one knew who was going to lose their job next.

"The old Oracle culture said that if you were a good performer and met or exceeded your goals, you would be rewarded for a job well done," one former executive said. In general, the rewards were high pay, bonuses and traveling in high style, the former executive said. "That culture is dead."

Ellison *recentralizes company*

The 400 or more employees laid off from Oracle's 4,000-person domestic work force were, in many cases, given only two weeks' severance pay, even though some had served the firm for five years or more, sources said. The company declined to reveal severance specifics. Some employees lost their jobs based on performance reviews and others because their departments were reduced in size, company sources said.

"One difficulty is that Oracle doesn't handle transition very well," another former executive said. Among the company's top executives, "Very few are willing to stick their neck out and say, 'This is the way it is,' and go on from there." As a result, he said, the bad news continues to come in dribs and drabs rather than being presented as part of an overhaul of the company, one of the largest independent software suppliers in the world.

"What we are guilty of is doing this in real time," countered Chris Greendale, vice-president of marketing at Oracle U.S.A. "Look at how visible and upfront the company is about what it's doing."

Though concerned about Oracle's financial prospects, users seemed more concerned about future product plans — something they intend to focus on at this week's International Oracle Users Group meeting in Anaheim, Calif. "A layoff on the order of 10% doesn't worry me much at all," said Warren Capps, chairman of the Mid-Atlantic Oracle Users Group.

Of greater concern, Capps said, was the future of product development, particularly in the areas of Oracle's Version 6.0 relational database management system, which first began shipping in November 1988 but experienced an extended rollout for all platforms supported by Oracle and its SQL*Forms 3.0 report writer, which began shipping for the Digital Equipment Corp. VAX last December.

"They're still behind the times on their products because so much of their development is spread across 80 [hardware] platforms," Capps said. "They spend a tremendous amount of resources just to maintain the compatibility of new releases."

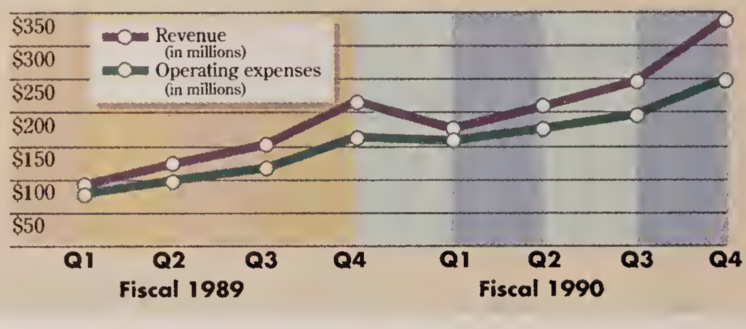
If the cutbacks threaten product enhancements, they could ignite many brushfires in the grassroots user groups, user activists said, adding that Oracle must now focus on its installed base. "It appears that research and development is safe" from the cutbacks, said Tony Ziemba, president of the New York Oracle Users Group. "But we will be checking to get a confirmation of this in Anaheim."

Oracle management has clearly been sobered by recent events. The day after the layoffs, said one senior Oracle product manager, "I sat my people down and made sure everyone on the technical staff understood what was going on." He added, "You attach so much of your self-worth to your job, and I didn't want what was happening to compromise their work."

With the stress of the layoffs rippling throughout the company, Oracle executives are promising that the free-spending days of Oracle's sales staff are over.

Losing the race

Oracle's revenue has grown but will be eclipsed by expenses



Source: Oracle Systems Corp.

CW Chart: Paul Mock

"We will focus on things that are important to our clients in a manner that won't look like we're spending money without any reason to do so," said Michael S. Fields, president of the Oracle U.S.A. sales and marketing subsidiary.

Analysts said the overall economic slowdown has lengthened Oracle's sales cycle, making it harder to close big orders so they can be stated as revenue. Compounding the phenomenon was Oracle's extremely aggressive sales stance, which may have been "eating into" future revenue for the sake of fiscal 1990's bottom line. "Until now, we were a revenue-driven organization," one senior manager said. "When we needed more money, we just went out and closed more business. But conditions have changed, and we just can't do that anymore."

There is a corporate explanation for the recent slide, which began in April with a $15 million restatement of third-quarter revenue. "The capital spending cycle is slowing down," explained Michael Musson, director of investor relations at Oracle. "In June, we had intended to build our business up as if we were going to grow at 50%. Now, it appears that 50% was way too optimistic."

"When there was a third-quarter shortfall, they probably told themselves they would make it up in the fourth quarter," said Kenneth Burke, a vice-president of research at Alex. Brown & Sons, Inc.'s San Francisco office. "But that way, you end up with no pipeline for the first quarter, and that's probably part of what's gone on."

Tierney *loses out in consolidation*

Two weeks ago, in the aftermath of the financial bad news, Gary Kennedy — a 10-year Oracle veteran who helped build the company — was replaced as president of Oracle U.S.A. by Fields, who had directed Oracle's U.S. field sales force. Kennedy remains with the firm, continuing to serve as chairman of the Oracle Complex Systems Corp.

As a result of the consolidation, some executives have chosen to leave, saying they believe the shakeout will continue. Among them was Atam Lalchandani, a well-known Silicon Valley financial specialist who was named chief financial officer of Oracle U.S.A. in May. He had joined Oracle in March. Tom Siebel, a sales vice-president who had been close to Kennedy, took a one-year leave of absence, the company said. Sources close to both executives said they were leaving the company voluntarily.

One direct casualty of the reorganization was Peter Tierney, who was promoted from senior vice-president of product marketing to head up Oracle's intercontinental sales organization in May. Tierney, who had just started to direct the sales forces in Canada, Mexico, South America, Africa and Asia, was terminated during the consolidation of sales management, Oracle said.

Temporaries released

Although Oracle did not initially offer the information, it now appears that up to 200 more "temporary workers" also lost their jobs on Sept. 17. "We no longer have any temporary workers in the U.S., with a few exceptions," Musson said.

Oracle CFO Jeffrey Walker, who was promoted last week to a second role as executive vice-president, will oversee all financial functions in an effort to reduce spending. He joins Geoff Squire, head of worldwide sales and distribution, at the corporate executive vice-president level; both report directly to Ellison.

"There are going to be some real transition issues there," said David Bayer, a senior analyst at Montgomery Securities in San Francisco. "They've recentralized after having decentralized in May. I think Wall Street's going to look for evidence that the company has complete control over its operations and that they keep their promises with their customers about meeting product schedules in a timely fashion. Right now, there's no reason to be confident of those factors."

FCC extends reach of price caps

BY GARY H. ANTHES
CW STAFF

WASHINGTON, D.C. — If the Federal Communications Commission is correct, actions it took last week will lead to lower prices for users of long-distance data and voice communications services. The FCC extended its system of price caps and floors, adopted for AT&T in 1989, to the interstate services of local telephone companies.

Beginning Jan. 1, the seven regional Bell operating companies and GTE Corp. must move to the price caps system; other local companies, which are smaller, also have the option to do so.

The setting of price brackets replaces rate-of-return regulation, in which prices are pegged to an allowed return on capital investment. The FCC developed price caps formulas that it said should result in lower charges to long-distance carriers for connections to local networks than would occur under the rate-of-return concept. The commission estimated that the new scheme would knock billions of dollars off bills for long-distance services over the next four years.

Price caps regulation allows prices to rise but at less than the rate of inflation. Price caps also provide sharing of earnings above certain thresholds with customers.

The commission also voted to reduce from 12% to 11¼% the maximum allowable rate of return that local telephone companies may earn on charges to long-distance carriers for local connections — a move it said will reduce those fees by $337 million in the first year.

AT&T is required to pass on to consumers all savings from reductions in local connect charges. Other long-distance companies are expected to follow AT&T's price reduction lead as a matter of competitive necessity, Richard Firestone, chief of the FCC's Common Carrier Bureau, said last week.

There is little industry agreement that the FCC's price caps formulas — which take into account inflation, productivity targets and uncontrollable costs such as tax increases and line charges — will work as intended or that telephone companies will behave as expected or be able to achieve the operating efficiencies hoped for. FCC commissioner Ervin S. Duggan called the FCC staff that developed the plan and its supporting formulas "Rube Goldberg's god-children."

Larry Blosser, an official at the 730-member, user-oriented International Communications Association, said the price caps plan should lead to more stable prices for high-speed private network services, which have tended to fluctuate widely. The FCC plan adopted special price limits for T1 and T3 services, saying they may not vary more than 5% up or down, with adjustments for changes in the price cap, each year.

This price caps plan will be in effect for four years, during which time the commission will evaluate its effectiveness and fairness.

NEWS SHORTS

AS/400 joins CIM lineup

One year after ramping up more than 50 products as part of a computer-integrated manufacturing (CIM) architecture, IBM added its midrange Application System/400 to the assembly line last week. The CIM Series/400 will fill a hole in IBM's CIM offerings, analysts said, and will position IBM against Digital Equipment Corp. in the small to midsize systems market. IBM also drew its RISC System/6000 into the CIM strategy.

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NSFnet management firm founded

IBM, MCI Communications Corp. and Merit, Inc. formed a nonprofit corporation to manage and operate the federally funded National Science Foundation's NSFnet. IBM and MCI will contribute $5 million each over the course of three years to the new firm, called Advanced Network & Services, Inc. Merit, a consortium of Michigan universities, has managed the NSFnet backbone since 1988, with IBM contributing hardware and software and MCI supplying high-speed digital circuits. Allan H. Weiss will leave IBM to head the new company. He said the firm will be able to step up support for the network while taking less of a regional view. NSFnet is being upgraded to speeds of 45M bit/sec.

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Businessland chops 10% of force

Businessland, Inc. is facing up and slimming down. Last week, the $1 billion microcomputer distributor announced a plan described by Chief Executive Officer David Norman as "a decisive move to make the tough decisions" needed to bring the firm's outgo into line with its income. Businessland will merge its Computer Craft retail subsidiary into the parent company, trim its worldwide work force by 10%, cut $50 million from inventory and delete a management layer from its sales organization by promoting computer industry entrepreneur Michael Poehner to senior vice-president of sales and marketing.

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SPSS repackages PC version

SPSS, Inc. released SPSS/PC+ Version 4.0, a major repackaging and enhancement of its statistical software package for DOS machines. SPSS claims to have the largest share of the personal computer statistical software market. The release is in part a response to charges by competitors that SPSS is overpriced. SPSS/PC+ 4.0 has the basic module of Version 3.0 split into two modules: SPSS/PC+ Base and SPSS/PC+ Statistics. The Base module will sell for $195, with additional modules starting at $295 each. SPSS said stripping down the package is a strategic move that will draw more users to statistical software packages.

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Quattro Pro updated

Borland International launched its latest attack on the spreadsheet market last week with the release of Quattro Pro Version 2.0, an updated version of its 1-year-old spreadsheet application. The new program includes enhanced problem-solving abilities as well as advanced graphics and will ship by mid-November. Borland will offer upgrades to Quattro Pro 1.0 users and owners of other high-end spreadsheets, including Lotus Development Corp.'s 1-2-3. The new program will be priced at $495, while owners of Version 1.0 can upgrade for $80.

Hyatt

FROM PAGE 1

the reservation system. In 1987, it became AT&T's largest 3B2 site, installing the Unix minicomputers in virtually all of its properties worldwide.

Last December, Biggs said, he met with AT&T and Informix Corp. and told both vendors that switching the central reservation system — which had worked under IBM's Transaction Processing Facility (TPF) operating system since 1982 — to Unix would have to be a three-way partnership.

"I told them we didn't want to bet the ranch," said Biggs, who came to Hyatt 5½ years ago after a 16-year career at Howard Johnson.

Both AT&T and Informix provided details, under nondisclosure, of pending products. AT&T outlined its System 7000, a reduced instruction set computing server aimed at OLTP settings and supplied by AT&T partner Pyramid Technology Corp. Informix revealed the specifications of Informix Online, a beefed-up version of Informix Turbo that addresses many OLTP issues, such as data integrity, on-line archiving and disk mirroring.

Hyatt has five System 7000s — three for the reservation system, one small model as a development tool and one for a sales and marketing application that supports 120 users. The company has set a goal of serving 1,500 users with the System 7000s.

The reservation system was cut over early last month. Remarkably, Hyatt elected not to run the new system in parallel with the old. "We'd benchmarked the hell out of [the 7000s]. We felt confident it would work," Biggs said.

While the application ran flawlessly in its first week, a combination hardware and software glitch crashed the system for five hours the second week.

A week of debugging located the problem, "and since then, we've made 30 minor changes to the application," Kerr said.

As if replacing an IBM mainframe with coupled Unix processors to a relational database was not ambitious enough, Hyatt also switched out its private data network the same day, replacing a dedicated Systems Network Architecture network with Transmission Control Protocol/Internet Protocol connections over 56K bit/sec. lines and Ethernets in the hotels.

Gilbert Wai, executive director of product marketing at Informix, conceded that for the classic TPF users — the nation's largest airlines — a Unix alternative is still not an option. "But I believe [Unix] is moving in that direction," he said, adding that it was not inconceivable that thousands of users could be supported in such an on-line environment.

David Joel

Hyatt's Kerr (left) *and Biggs lead jump to Unix*

TPF was introduced by IBM 23 years ago to the airline industry and later moved to other industries in need of TPF's 2,000 transaction/sec. rating.

Hyatt's central reservations center will link to the TPF-based computerized reservation systems (CRS) of the airlines through an interface provided by The Hotel Industry Switch Company (THISCO) in Dallas. THISCO, also a System 7000 user, is working on creating a common interface between the different airline systems and those of the hotel chains, which much now attach to each CRS separately.

IBM has little to fear from Hyatt's example, said those connected to the project and others familiar with TPF.

Hyatt was an atypical TPF site, running the system on a 4381 rather than a 3090-class mainframe. Moreover, the largest of an estimated 250 to 300 TPF licensees worldwide, among them the nation's largest banks and airlines, will not abandon their sizable investments in TPF software, programmer know-how and hardware.

While the major airlines probably will not jettison their enormous investments in TPF and IBM mainframes, they are likely to "try open systems in back-door applications or for new, relatively small applications," said Omri Serlin at ITOM International Co. in Los Altos, Calif.

IBM 'memory lapse' ruffles rivals

BY ROSEMARY HAMILTON
CW STAFF

An IBM mainframe memory upgrade policy officially announced earlier this month has competitors crying foul and suggesting that it penalizes users who do business with them.

Users who upgrade central storage on the 3090J model may be required to order at least one additional thermal conduction module (TCM) at a cost of $57,100 if the upgrade is "not directly ordered from IBM," according to a Sept. 5 letter.

"We are convinced that it is nothing more than a way to stop users from buying used on third-party memory," said Robert Bardagy, a senior vice-president at leasing company Comdisco, Inc. EMC Corp., which makes memory sold through Storage Technology Corp., said some customers have postponed purchases because of the added costs.

Lou Finnegan, vice-president of marketing at Cambex Corp., which sells memory upgrades, referred to the policy as a "blatant predatory practice."

These challenging comments are strongly denied by IBM. The U.S. Justice Department's 1956 consent decree expressly prohibited IBM from engaging in pricing practices that would tend to lock out competitors because of IBM's dominance.

According to an IBM spokesman, central storage is handled as a complete main memory system with two key parts: the actual memory board and a TCM to manage it. Customers pay IBM one package price, but if a customer purchases the memory upgrade from a non-IBM source, the customer is doing the upgrade on a component basis and pays for the additional TCM separately, adding $57,100 to the upgrade price.

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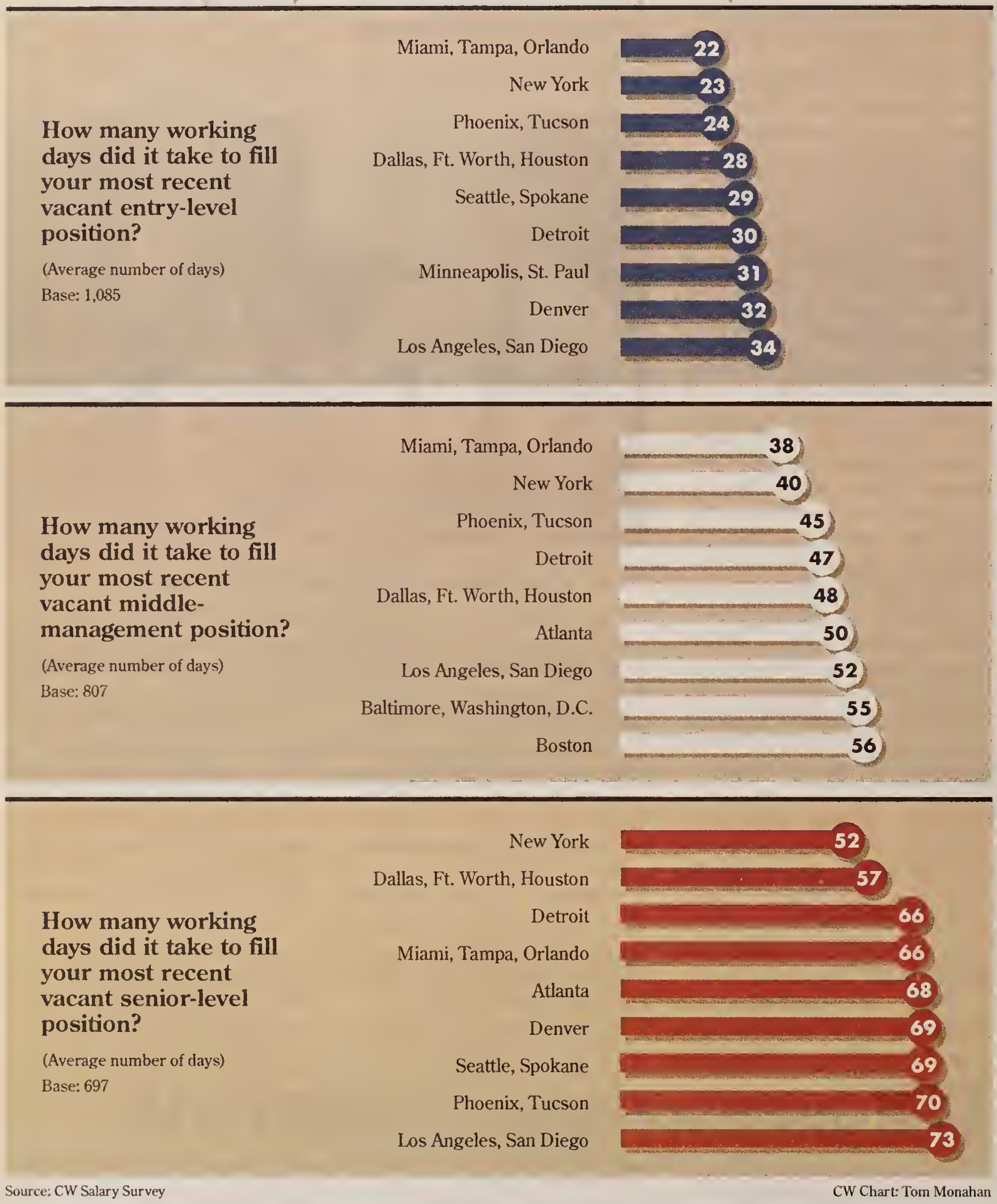
TRENDS

Information Systems Hiring

A CW survey of IS managers shows New York and Florida vacancies fill the fastest

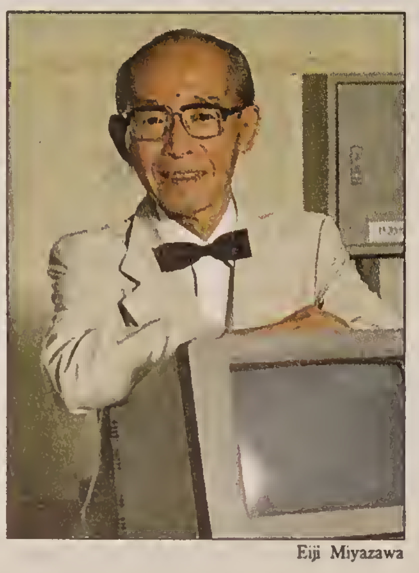


Source: CW Salary Survey

CW Chart: Tom Monahan

NEXT WEEK

Noburo Minamisawa began designing information systems in Japan in 1953 and installed the first commercial Univac in Japan at Onoda Cement Co. in 1959. Now, still advising Onoda on IS at 72, Minamisawa has left a significant mark on both private- and public-sector computing in Japan. See Manager's Journal for a profile.



Eiji Miyazawa

As barriers to international trade fall, existing markets become saturated and new opportunities beckon from foreign soil, one lesson many firms are learning is that they can't afford to operate as independent entities. Rather, they must function as a global enterprise. Find out how IS can help multinational firms cope in Executive Report.

INSIDE LINES

No 'Made in Japan' label

Amdahl executives were piqued over questions relating its latest mainframe announcement (see story page 4) to one made earlier in the month by Fujitsu, which owns 43% of Amdahl. "I know it's a hard thing to get across, but we design, we develop, and we deliver these machines," said Amdahl President Joseph Zemke. Nevertheless, Fujitsu's recent announcement of its M-1800 high-end machine, which also has an eight-way configuration with more than 350 million instructions per second, would appear to be quite similar to Amdahl's 5995. Amdahl and Fujitsu are both "using the same bricks," explained Erika Williams, vice-president of processor product management. "However, we're using them to build different houses."

Got a problem? Just upgrade

Several users of Novell's remote print service on Netware 386 Version 3.1 loadable module (NLM) are reporting lockups, errors and outright crashes. Martin Marietta's Information Systems Division said Version 1.1 of NLM is knocking all remote Postscript serial printers off line. Novell said it is only aware of problems with Version 1.0 of NLM.

Air Force highs and lows

The U.S. Air Force is getting ready to cancel its annual worldwide microcomputer conference, slated for October in Gulf Port, Miss., according to a source. The event, which normally draws 2,000 microcomputer managers, was expected to draw only 800 this year. Blame impending budget cutbacks for the smaller than usual turnout, our source said. Meanwhile, with a personnel tracking system maxxed out because of Operation Desert Shield, the Air Force is reportedly seeking a few good men or women in the software programming business in the Washington, D.C., area to do a "quick-and-dirty job on fixing" it, said someone who claimed to have been contacted.

And a merry Christmas to all?

An almost identical version of the IBM Christmas virus that infected thousands of computers on IBM's internal mail in December 1987 has reportedly been posted on the Bitnet network. The virus puts a tree and seasonal greeting message on the screen of infected computers and is known to replicate wildly, shutting down computers. No word of any infections, however. Bitnet connects computers at more than 200 universities as well as to the Earn network in Europe, the entry point of the original virus. IBM was forced to shut down its 350,000-terminal network for nearly three days to get rid of the virus.

Stuff this in your billy-can

According to Australia-based news sources, Mips Computer Systems and Wang will formalize an agreement allowing Wang to use Mips computers as a Unix platform in New Zealand and Australia. The agreement will be the first such relationship established by the two, and Mips' Australian managing director Rob Byrne said he hopes it will extend internationally. The official word from Lowell, Mass.: "No comment."

Outsourcing, out shopping?

Times are wild and woolly in the outsourcing industry as two major vendors recently changed their business heads. At Litton Computer Services, John Cudworth has left for Affiliated Computer Services, the Dallas-based service firm headed by Mtech founder Darwin Deason; Tom Schoen has replaced Cudworth as vice-president of business development at Litton. And at Genix, President Tom Mabor is gone, replaced by Rudy Cifolelli, president of new Genix parent MCN/CSI.

New England Telephone recently informed customers that if they want to view adult entertainment on the company's videotex service, they have to sign a request for "access to the indecent services." We make no such judgments on callers trying to access our adult news hounds. Just call (800) 343-6474, and News Editor Pete Bartolik will hook you up without a declaration on your morality. Want a more hands-off approach? Fax us the dirt at (508) 875-8931, or message COMPUTERWORLD *on MCI Mail.*

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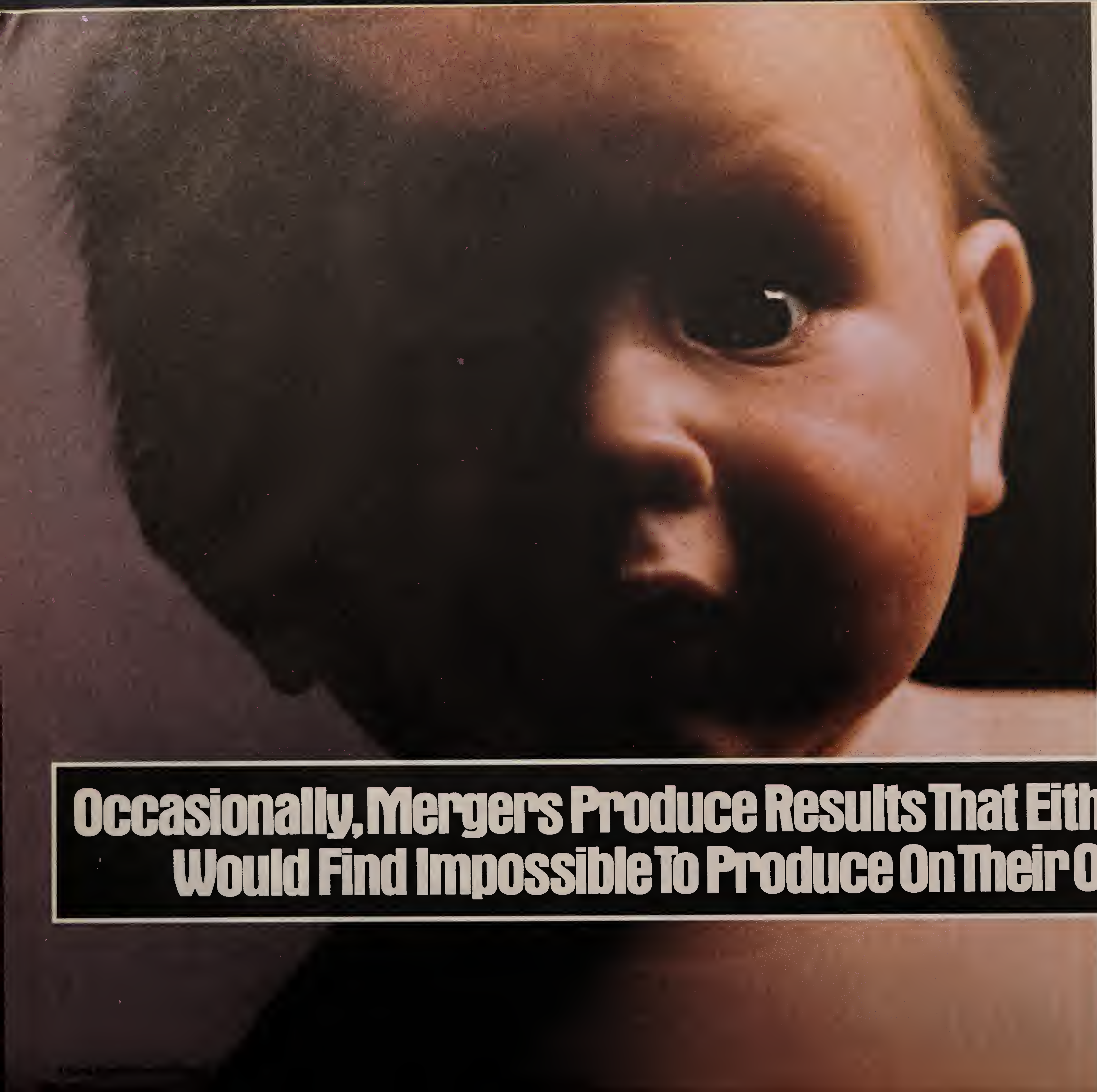

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